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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

The Current Issue.

Readers will find this month's Journal a very interesting number. Some further notes on the acidities of our sugar soils are contributed by Mr. H. W. Kerr; Mr. G. H. Hardy also has a useful note on some parasites of the blowfly. Two valuable fodder trees are described by Mr. White, and Mr. Shelton has added a historical note on the pig to his regular feature, which this month covers a description of the Gloucester Old Spot pig, a breed new to Australia. The activities of the Main Roads Board are specially featured, and in connection with which some very fine plates are reproduced through the courtesy of the Board and its secretary, Mr. J. E. England. Among interesting reprinted matter is an article on the bases of arable farming, and an account of some research work in respect to a peculiar ear disease in pigs. A special set of plates, sent to us by Mr. H. W. Mobsby, the Queensland officer at the Empire Exhibition and also of this Department, depict the effective staging of Australian products at Wembley. Usual features are well supported with informative matter, and generally the November Journal will find ready appreciation.

A Fruit Fly Week.

Something novel in State education was initiated in the course of the month in the State schools in the Stanthorpe district in the form of a "Fruit Fly Week." This was part of a scheme formulated by Professor E. J. Goddard, D.Sc., of the Queensland University, in his fruit fly campaign, and in respect to which he is receiving the whole-hearted support of the Department of Public Instruction. The basic idea of the scheme is that when a community knows the life history and habits of a particular pest, it is better armed for its extermination. This year a strong co-operative effort is being made by the fruitgrowers, assisted by the University and the Agricultural and Educational Departments, to prevent any serious fruit fly infestation in the Granite Belt. At every school in the district a special daily lesson was given on the fruit fly, its life history, the meaning of the campaign, and recommendations for checking any local invasion. Specimens and a treatise on the subject were provided for each teacher. In continuance of the good work special weekly lessons dealing with particular phases of the campaign will be given throughout the fruit season.

Minister's Efforts Appreciated.

The Stanthorpe District Council of Agriculture has forwarded the following resolution which was adopted unanimously at its last meeting on 1st November:—"That this meeting of the Stanthorpe District Council expresses its sincerest appreciation of the great assistance rendered to the fruitgrowers of the Granite Belt by the Hon. W. N. Gillies, Minister for Agriculture, in granting the several requests made by Professor Goddard for the purpose of carrying out the fruit fly campaign. We fully realise that, at a time when it is necessary for the Government to practice rigid economy, Mr. Gillies' action in incurring new expenditure to help in the control of the fly is deserving of the best thanks of the fruitgrowers, not only of this district but of Queensland."

Cotton Experimental Plots—Entomological Studies.

The Cotton Section of the Agricultural Department has been feeling the want of plots where experiments may be carried out under typical conditions in the Lockyer, and arrangements were made recently with the Agricultural College authorities to carry out definite experiments on the college farm this season. A single variety of seed only is being grown—the Acala—which is now being thoroughly tried out under Lockyer conditions. The experiments that have been devised are ratoon and standover versus annual; different methods of pruning ratoon cotton; fertiliser tests; and time of thinning experiments. In addition to this, a number of pure progenies of the Acala variety, which were selected from single plants last year, are being grown for further observation, and it is hoped by this means that strains of Acala, particularly adapted to local conditions, will be obtained. In addition to the foregoing, the cotton entomologist will use these plots for his experiments and observation work, and cages have been erected over different plots. The ratoon plots at the present time are affording an interesting field of investigation for the entomologist, and it appears probable that in some of these plots in which new bolls already have formed, pests have discovered an abundant food supply, which will allow them to carry over and increase in numbers preparatory to an invasion of the main annual crop later on in the season. The indications are, however, that one of the chief drawbacks to ratoons in Queensland will be this question of carrying over the insect pests from one season to another, and the situation from this point of view will have to be very carefully studied.

The Banana Duty.

At a sitting of the Commonwealth Tariff Board in Brisbane, in the course of the month, the case for the retention of the duty on bananas was further considered. The Minister for Agriculture and Stock (Hon. W. N. Gillies) is a strong and unremitting advocate for a continuance of the duty, and an unanswerable case was presented to the Tariff Board by his departmental officers. Bananas are now being produced in Queensland in quantities sufficient to supply the whole Australian trade in this fruit. In our far Northern province alone, banana production could be developed to such an extent as to exceed all Commonwealth requirements. The fact that most of the diseases and pests affecting bananas produced in Queensland were introduced in oversea importations is in itself convincing evidence of the need of the protection of this important industry. In this State banana-growing is a white man's industry, growers pay wages in accordance with the demands of a white man's living standards, and it has proved peculiarly adaptable to effective repatriation of ex-service men. It is also an industry peculiarly suitable for the industrious man possessed of only small capital, and in that respect is proving one of our best land settlement agencies. To reduce the tariff under which banana-growing has become a more-or-less stabilised Australian industry would be a wofully short-sighted act, and no authority with any claim to statesmanship is likely to consider seriously any proposal to that end. The chairman of the Board evidently appreciated the vigilance of those interested in the industry and commended their initiative and appreciated the strength of the case that they submitted.

Agricultural Scholarships.

Applications are being received from all parts of Queensland, on behalf of boys attending both State and secondary schools, for the scholarships offered by the Department of Public Instruction and tenable as from the beginning of the coming year at the Agricultural High School and College at Gatton. Forty-five scholarships will be awarded; thirty tenable in a junior course, and fifteen at a senior course in agriculture. The junior scholarships will be awarded to successful candidates at the last State scholarship examination who may apply for them; but should there be an insufficiency of these candidates, the balance of the scholarships will be awarded to successful candidates at the high school entrance examinations this month. The junior scholarships entitle the holders to three years' residence and tuition. The senior scholarships are limited to successful candidates at this year's junior public examination. The course of instruction will be thoroughly practical and scientific, and will also cover a sound general education.

Bureau of Sugar Experiment Stations.

FIELD REPORTS.

The Northern Field Assistant, Mr. E. H. Osborn, reports to the Director, Bureau of Sugar Experiment Stations (Mr. H. T. Easterby), under date 27th October, 1924:—

Cairns District.

When this area was inspected about the middle of September the two local mills were steadily making good progress with their very large crops of cane, and were getting through some big crushings.

Hambledon had just finished a remarkably good week, when its week's figures ran into 6,109 tons. When the size of the mill is considered it is a wonderfully good performance. Up to time of writing, in both mills the percentage of burnt cane was below the average.

From Freshwater some very heavy yields per acre were harvested, as the following figures attest:—

Judas, C.—35 acres of 14 months' old Badila, 72 tons per acre (plant).

Mason, A.—6.6 acres, about the same age, 61 tons per acre (plant).

McManis and Painter.—24 acres, about the same age, 50-60 tons per acre (plant).

Mann and Roach.—Plant, 61 tons per acre; first ratoons, 40 tons per acre; second ratoons, 27 tons per acre.

At McManis and Painter's some December-cut ratoons look good enough for a 30-ton crop.

Edgehill.

At this small cane centre some fine cane was noticed, particularly upon Mr. Fleming's and Mr. Vesey's farms. The former had just completed harvesting some 937 tons off 31 acres, portions of which were first and second ratoons. His best cane was a splendid block of H.Q.458. This at ten and a-half months old cut at the rate of 55 to 60 tons per acre. Ratoons are also showing a fine growth. Quite a number of adjoining growers have planted blocks of this cane. The soil here is of a reddish and slightly stony nature, and evidently suits this variety.

Mulgrave Mill Area.

This area is going ahead very rapidly, the township spreading out in several directions at a great rate, and its general air of prosperity is most marked. The mill is doing fine work, and the large crop is cutting well up to the earlier estimates. Harvesting conditions have certainly improved vastly, and the cane going through the rollers is far fresher than formerly.

Generally, the whole area looks extremely well, and some beautiful paddocks of young plant cane were noticed. In the writer's opinion the young plants, both in quality and quantity, are very superior. With the present weather conditions prevailing, next year should be a mighty big one for the Mulgrave.

One very pleasing feature of the area was to see how remarkably green and healthy the Meringa lands were looking. Grubs had not done any damage, and old residents said that the prospects for next year there were far brighter than they had been for very many years.

Of varieties of cane locally grown, probably 70 per cent. is Badila, with, say, 20 per cent. D.1135, and 10 per cent. of other varieties. Very little borer damage seemed to have been caused this year, and rats were not very troublesome.

Diseases.—In the Hambledon area Leaf Scald was noticed on several farms at Waree and near Edgehill. At the latter place a block of second ratoon Badila was

noticed to be heavily infected. Cane from this paddock was being cut for plants when the writer came along; in fact several stools showing the disease very strongly were within a few yards of where the plant cutters were and who did not know the disease. In two of the cases the particular parts of the paddock where the disease showed up were of a low-lying, badly drained nature, but on the other the drainage was all right and the cane well cultivated.

In the Upper Freshwater area, Leaf Scald was noticed on three of the farms visited. In two of these cases paddocks of second ratoon (Badila) that had been rather neglected showed a good deal of the disease. In two other paddocks young plant (N.G.15) showed the characteristic leaf markings in places, and upon inquiry I was told that in each case the blocks from which the plants came were also affected.

In the Mulgrave area second ratoons (N.G.15) were badly affected in places. At Aloomba, adjacent to the river, first ratoons (N.G.15) were found to be heavily diseased, and symptoms were also noticed in a plant crop now nearly ready to be cut.

With such examples in mind it is worth remembering that Mahona, one of the principal canes upon the Richmond River, had to be discarded a few years ago from this cause, and were such a thing to happen to Badila the consequences would be serious for Northern canegrowers. It therefore behoves every grower to be exceedingly careful in seed selection.

Mossman Area.

When this area was visited early in October the general outlook was most promising. Crushing was proceeding at a very satisfactory rate and the management hoped to finish the estimated crop of 80,000 tons before Christmas. In passing, it might be mentioned that this year's crop is the largest to be handled by the mill since 1906. During the past few years the tonnage has been slowly but surely increasing, and with the larger area of new land now being put under, next year's figures should easily exceed the present season's.

One of the principal new areas is Whyanbul Creek, at Saltwater. It is intended to lay down some 3½ miles of permanent line to connect this area. There are about 700 acres of land here, about 150 acres of which are now being planted.

Quite a large area of this is new land, whilst a portion of the other has not been cropped for many years. All of it looks likely cane land. Another portion of the district that has grown considerably during the past two years or so, is Cassowary. Quite a few new suppliers are established, and some very heavy crops of Badila were being harvested from some of the small, though rich, pockets. Saltwater area proper also looks remarkably well, the farm of Messrs. Phemister, Coultard, and Co., being a credit to them. Right throughout the district good strikes of young plant cane were seen, whilst the recently-cut ratoons compared more than favourably with any seen elsewhere. This, no doubt, is partly due to the favourable weather conditions experienced during August, when a fall of 6.57 in. was recorded.

Diseases.—So far this district has been fairly free from disease. Leaf Scald was noticed to a rather marked extent in a block of Green Goru (N.G.24B), third ratoons, and to a lesser extent in an adjoining paddock of second ratoons of the same variety. An odd stool of twelve months' old plant B.147 was also seen, and a stool or two of first ratoons, H.Q.426, recently cut, was also showing the symptoms. In another place a stool of second ratoons, D.1135, was similarly affected. In some old B.147 ratoons, Leaf Stripe was also observed. Both these diseases are capable of causing great damage, and growers would be well advised to be extremely careful in seed selection.

Cane Analysis.—The following analyses in connection with several new varieties were very kindly supplied by Messrs. Crees Brothers from their Boondarra Farm:—

Plant cane, twelve months old, grown upon low land, cut 30th August:—

Cane.	C.C.S.	Weight of stick. (lbs.)	C.C.S. in stick. (lbs.)
E.K.1	13.64 ..	5.35 ..	.716
Nanemo	17.18 ..	5.09 ..	.859
H.Q.458	14.8 ..	9.25 ..	1.369
E.K.28	17.57 ..	5.57 ..	.966

Second ratoons, eleven months old, grown on high land, cut 13th August:—

Cane.	C.C.S.	Weight of stick. (lbs.)	C.C.S. in stick. (lbs.)
H.Q.458	14.22 ..	4.0 ..	.568
E.K.28	15.66 ..	5.0 ..	.783
H.109	13.25 ..	6.5 ..	.861
H.K.426	16.25 ..	5.0 ..	.812
Q.903	11.42 ..	5.5 ..	.628

While in the area, many inquiries were made for Q.813 and E.K.28, for the returns of both canes have been consistently good. Referring to the former a block of third ratoons is now being harvested, cutting probably 17 or 18 tons per acre. Last analysis of this gave a c.c.s. of 14.8, whilst the mill average for the same period was only 13.2.

A fine plot of young plant H.109, and also a plot of Gingor, was seen upon Mr. W. S. Johnston's Drumsara Estate. The former looked extremely vigorous, and was making very rapid growth.

Since my last visit a large number of new tractors have come into operation, and generally the district is most promising.

SOME NOTES ON THE ACIDITIES OF QUEENSLAND SUGAR SOILS.

By H. W. KERR, B.Sc., Sugar Soils Travelling Scholar.

In the June number of the Journal were published some introductory remarks on soil acidities. The writer has since taken advantage of a tour through some of our Queensland sugar districts to investigate further this important question, and has examined a considerable number of samples representative of the various sugar soils.

The results present some very useful information and apparently explain a number of causes of infertility which have not, hitherto, been clearly understood; on the other hand, they throw some light on the reason why many of our soils, in spite of the presence of considerable amounts of acidity, do not respond to liming. This latter class is represented by the red volcanic soils of the Bundaberg and Bingera areas, which are found to be benefited but little, if at all, by even heavy applications of lime. Further results confirm what was previously suggested, that the acids in these soils are organic in nature, and become toxic only when the soils are badly drained and poorly aerated.

The Mackay district soils show, on the whole, an absence of any high degree of mineral acidity, and most of them are naturally well supplied with lime. One exception to this statement stands out in the case of a curious yellowish-brown subsoil, which occurs in the Mount Jukes area. In many instances here the surface soil is only a few inches in depth, and the subsoil is brought to the surface even by shallow ploughing. When turned up damp it has the appearance of a heavy clay, but when once air-dried and remoistened the clods disintegrate readily, yielding a free soil. This material is the ultimate decomposition product of the diorite rock which is abundant in the area. It is very rich in grains of ferruginous minerals, and flakes of bleached biotite mica are plentiful. An analysis shows that the subsoil is very well supplied with lime, and contains about an equal amount of magnesia. It is exceptionally rich, both in total and available phosphoric acid; on the other hand, it is very deficient in potash. The most striking feature, however, is the high value found for the mineral acidity, which is due almost entirely to soluble aluminium salts, the presence of which is very harmful to plant life when in excess of a certain small percentage.

The farmers in this district have been troubled very much with cane grubs, and as a consequence plant only D. 1135 variety to ensure a crop, but it is very probable that the poor progress of some of this cane is not altogether due to the grub attacks, but also to the toxic effect of the soluble aluminium salts. Reference is made here, chiefly of those farms on hillsides, where the surface soil is very shallow, and farmers are advised to be very cautious about turning up more than a slight amount of this subsoil with each ploughing. With judicious cultivation it is quite possible that the condition of this material will be steadily improved even without applications of lime, as the soil is already well supplied with this constituent; for rapid improvement, however, free use of lime is absolutely imperative.

Passing on to the soils of the Burdekin Delta, we become acquainted with the dark alluvial loams and sandy loams, which are, on the whole, extremely fertile; when we remember that this is a district of low rainfall, and, as a consequence, the leaching of available plant foods from the soil is at a minimum, we readily understand the natural richness of these lands. The acidities of these soils, generally, is very slight; indeed, in several instances, the reactions of the soil were distinctly alkaline.

The Innisfail, South Johnstone, Mourilyan, and Babinda districts have very little in common with any of the soils encountered south of Townsville. These are districts of very heavy rainfall, and the soils are continually subjected to excessive leaching of soluble soil constituents. A study of the analysis of a typical soil from any of these districts, shows that, on the whole, the soils are very deficient in lime and contain a rather poor supply of humus. Cultivation and the removal of several heavy crops from some of these lands has still further depleted the lime and humus content and allowed the development of acid mineral substances in the soil. One farm in particular, on the Innisfail Estate, contained such a high percentage of these acid compounds that a cane crop of only ten tons per acre was produced annually, and this from an alluvial loam in a locality reckoned to contain the best soils in the district. This is not an isolated case, for many crops were found on examination to be suffering from the same causes, although, perhaps, not to the same extent.

The remedy for such a soil is to give the land heavy applications of lime, preferably followed by a dressing of superphosphate, and the humus content increased by the ploughing in of a green manure crop such as Mauritius beans.

It might be stated that all the soils in these districts would benefit very largely by liming. It is a well-established fact that artificial fertilisers cannot be expected to give returns on soils deficient in lime. For instance, when ammonium sulphate is applied to a crop, the "ammonium" portion is ultimately absorbed by the roots, leaving behind the sulphuric acid, which then removes an amount of lime equal in weight to the ammonium sulphate applied, provided the necessary lime is present in the soil; if this is not the case, it remains to increase the already excessive soil acidity.

A common feature in the canefields of these districts is the presence of a partially sterile pocket or "poison patch," as it is commonly known, where the cane grows very poorly or not at all, whilst the surrounding crop is very healthy and showing vigorous growth. Careful inspection shows that the soils are apparently identical, and the cause cannot be attributed to any defect in the substrata. The writer was led to believe then, that the sterility was a chemical nature, and an investigation was made of several of these patches, by comparing the acidities of the defective soils with those of the adjacent portions of the field carrying good cane. In every instance it was found that the poor soil was excessively high in mineral acidity, due almost entirely to soluble aluminium salts. The presence of these latter seems to give rise to poor root development and consequent stunting of the cane, while in extreme cases the sets were completely rotted out.

In one field at the South Johnstone Sugar Experimental Station, four of these pockets were observed. On one, the cane (N.G.15) was very stunted, having only two or three sticks to the stool, and these about 18 inches long and ¾ inch in diameter. The least affected patch was certainly backward, by comparison with the remainder of the crop, which would cut out at over 30 tons to the acre. The remaining pockets carried cane showing growth intermediate to these two. The values of the factor "K" (which may be called the "liming coefficient") for these four plots is given in the following table, and it is seen that the higher value of "K" for the soil the more seriously the cane is affected.

Soil No.	"K" Value.	Remarks.
1	83	Least affected plot.
2	115	Growth intermediate to 1 and 3.
3	120	Growth intermediate to 2 and 4.
4	204	Cane in worst condition.

Average for the whole block—"K" .. .. 46.

The above is selected as a typical example, and was found to obtain, without exception, when any comparisons were made.

A study of the results of test on the alluvials of the Innisfail and South Johnstone districts shows that a value for "K" of over 60 indicates the absolute need of the soil for lime, and this is advantageously followed by a dressing of some phosphatic manure, such as superphosphate. Of course, this "critical" value of "K" will vary for different soil types, being higher on rich and lower on poorer soils.

It must not be concluded from the above remarks that all sterile pockets found in otherwise productive canelands owe their infertility to this cause; similar phenomena are common in many others of our cane districts, but it is most improbable that a general explanation will apply in all cases. Until such times as a closer investigation is made in the Southern districts the above corrective treatment is recommended only for the soils in the humid cane areas of North Queensland.

It is regretted that a more extensive soil examination was not possible, due to the limited time and facilities at the writer's disposal, but, as the acidity tests are being continued by the Agricultural Chemist on all soils submitted for analysis, we may, at an early date, be able to make some broader generalisations on this very important soil problem.

The following are the results of some tests made on soils of the Innisfail District:—

Soil No.	Locality.	"K" Value.	Remarks.
5	Mundoo ..	8	Red volcanic ridge. Cane growth good.
6	do. ..	19	Creek, flat alluvial, carrying heavy crop of 7R 428.
7	do. ..	39	Alluvial flat, fair crop.
8	do. ..	73	"Poison" patch.
9	do. ..	40	Adjacent to soil No. 8, but cane shows much better progress.
10	Goondi ..	Nil	Red basaltic ridge.
11	do. ..	4	Alluvial flat, carrying good crop.
12	do. ..	Nil	Alluvial flat.
13	Innisfail Estate	95	Crop only about ten tons per acre.
14	Mourilyan ..	62	Alluvial soil, carring poor crop.
15	do. ..	18	Red loam, poor cane crop.
16	Silkwood ..	166	"Poison" patch.
17	do. ..	112	Sandy soil, does not grow cane.
18	Japoon ..	Nil	Alluvial soil, carrying good crop.
19	do. ..	61	"Poison" patch, old land.
20	El Arish ..	13	Good land, producing forty-ton crop.
21	Harvey's Creek (Babinda)	85	Crop very poor.
22	Babinda ..	90	Cane backward in growth.

CREAM CAN ECONOMY.

All dairy farmers should see that their milk and cream cans are in a condition fit to contain these products. It is not sufficiently recognised that old, rusty, broken, or dented cans may be responsible for a large percentage of the objectionable taints that occur in cream and milk. It has been conclusively proved, however, that this is so, and it is, therefore, folly for farmers to continue to use cans which for any reason may be regarded as insanitary.

A rusty surface on the inside of a can is one of the chief troubles, but one which in many cases can be very easily remedied by re-tinning. When cream or milk comes in contact with rust patches, it is very likely to develop a metallic or a tallowy flavour, both of which are very objectionable taints for the butter-maker. If the rust is allowed to remain for any length of time, the surface will become badly pitted, and traces of milk and cream will lodge in the uneven face, with the result that harmful bacteria will rapidly develop and the fresh cream will be immediately infected and more than likely badly contaminated before it can be treated at the factory.

Cans which are badly dented, especially round the shoulders, it is often almost impossible to clean thoroughly without a great amount of trouble, and they should, therefore, be attended to immediately they are damaged.

Broken necks and lids are objectionable, as they allow stale cream and milk to collect and contaminate the fresh cream.

THE BASES OF ARABLE FARMING.

By J. G. STEWART, M.A., B.Sc.*

Man's instinct to live was the compelling force behind his first attempt at farming, and the winning of food from the soil is still the primary object of the farmer's business. Modern practice has been gradually evolved from the simplest beginnings. Originally a hunter, and, later, a herdsman, man early realised what some of us seemed to have forgotten in 1914, that the greatest and most certain supply of food was producible by settling down and tilling his patch of land. The ranging stockman developed into a tiller of the soil.

Corn was being grown in Britain at the time of Cæsar's arrival, 55 B.C., and cultivation was largely extended and improved during the Roman occupation. Following the departure of the Romans in 410 A.D., there arrived, with their flocks and herds, the Angles, Saxons and Jutes, who settled in townships and marked off sufficient land to satisfy their common needs. Owing to internal dissension and foreign invasion, progress along these lines was slow and the manorial system was evolved. Men worked under the protection of a lord. Out of this grew the folding system, for the sake of the manure, a method which still obtains. Folding, together with marl or chalk, was one of the fundamentals of early arable cultivation. Corn yields were low, round about two sacks per acre, at the end of the thirteenth century. There were no potatoes, no root crops, and no clover as now grown.

About the time of Henry VIII. the system of landlord and tenant had taken shape and progress became more rapid. Large tracts of land were enclosed, and by the seventeenth century England had adopted a system of farming which, in a more developed form, is practised to-day.

The change from strips of land cultivated in common to enclosed fields, controlled by one man, was an important step in agricultural advancement. Men began to assert their individuality, to look ahead and to do some fundamental thinking. They were no longer satisfied with two corn crops and a bare fallow. Cromwell's soldiers, marching through East Lothian for the battle of Dunbar (1650), were much impressed by the luxuriant corn crops and the absence of bare fallows.

Horse-hoeing Husbandry and Rotations.

Sir Richard Weston, writing in 1651, advocates the growing of sainfoin, clover, trefoil, and lucerne. In 1701 Jethro Tull invented a drill for sowing corn and other crops in rows, so as to provide for horse-hoeing in between, and in 1726 we find Richard Bradley urging farmers to adopt arable cultivation on a larger scale and recommending a rotation of barley, turnips (eaten off by cattle or sheep), peas, and wheat. He further states: "This land may at any time be laid down for grass by sowing it with ryegrass and clover."

About the middle of the eighteenth century Lord Townsend introduced into Norfolk the rotation which is still known as the Norfolk four-course, and is the basis of all cropping systems in vogue in this country to-day.

The introduction of turnips was a notable advance. They superseded bare fallows on all but the heaviest soils by providing suitable facilities for cleaning the land, supplemented hay and straw as winter food for stock, and helped in the making of dung. By interposing clover between the corn crops the land was, at small cost, enriched in nitrogen—usually the most potent factor in increasing soil productivity; and as a result of the change more labour could be employed and distributed more evenly and regularly throughout the year.

Milestones of Progress.

Towards the end of the eighteenth century great strides had been made in the improvement of British live stock, and, a little later, the introduction of the system of under-drainage was yet another milestone on the road of progress.

The great industrial development that marked the opening of the nineteenth century, and the establishment of flourishing manufacturing towns, increased the demand for everything the farmer produced and led to the improvement of means of communication.

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*In "The Farmer and Stock-breeder" (U.K.), 2 June, 1924.

In 1803 the Government took the first step towards getting farmers a scientific education by employing Sir Humphrey Davy as lecturer on agricultural chemistry, and in 1843 Sir. J. B. Lawes founded Rothamsted and practically initiated the use of artificial manures in England.

Simultaneously with these developments farmers had, to a great extent, helped themselves by inventing and improving farm machinery, and superimposed on all of the foregoing considerations, fiscal arrangements (as, for example, the Corn Laws) were, as now, of fundamental importance in determining farming practice.

The Nation's Food.

In a recent pamphlet on the "Possibilities of British Agriculture," Sir Henry Rew and Sir John Russell supply figures which, taken as a whole, indicate that about half the nation's food is grown in Great Britain; that certain commodities (*e.g.*, milk potatoes, vegetables, and certain fruits) are almost wholly produced in this country; and that, on the other hand, our production falls short to the extent of 75 per cent. to 55 per cent. in respect of such articles as wheat, meat, eggs, and dairy produce. Of the latter group the market value of wheat, in particular, is governed by world prices, and the only alternative for the British farmer is to surpass his competitor in yield and go for the heaviest cropping variety. In meat, eggs, and dairy produce there would appear to be room for considerable expansion.

Let us, then, examine arable farming in the light of these facts and the present economic conditions.

Rotation: The Pivot of Arable Farming.

The pivot of arable farming to-day is the rotation—regarded too often, it may be, as immutable, like the Laws of the Medes and Persians. While the main reason for an alternation of crops is an economic one, a particular rotation is apt to remain stereotyped, irrespective of changes in the economic situation. The most productive farmers have aimed at getting the fullest return possible from the land without producing exhaustion; one crop follows another in quick succession. . . . . The particular practice adopted, however, is usually regulated by custom, the result of years of experience. A new-comer to a district should not lightly disregard established practice; at the same time it does not always follow that recognised custom is the best guide. . . . .

Keeping of Accounts.

One of the drawbacks of farming is that ordinary financial accounts—even where these are kept—do no more than show the gross returns from corn, cattle, or sheep; they give no information regarding the profit or loss on individual items. Without going so far as to suggest that all farmers should keep cost accounts, I do say that every farmer should keep at least a sufficient record of his transactions to enable him to satisfy the Inland Revenue authorities—a simple valuation at the beginning and end of the year, and statement of income and expenditure classified under the principal headings. The only other essential is a paged diary with cash columns in which should be jotted down, regularly, particulars of the day's work and the financial business transacted. By sitting down to the work the farmer would be able to determine with approximate accuracy the profits or losses on the various departments. If neighbouring farmers would analyse and compare their results a lot of valuable information would accrue to all concerned.

Bookkeeping is probably the most urgent need of the average farmer at the present time. . . . . Bookkeeping will not, at the outset, enable a farmer to convert a loss into a profit, but it will, at least, stimulate his mental processes and arouse that spirit of investigation and inquiry, which is the first step in progress and development.

Extension of Temporary Grass.

It was adversity that put the Danes on the track of their present highly organised and efficient system of farming. Similarly the depression of the last quarter of the nineteenth century was responsible for an alteration in the Scottish system of tillage, which still holds good and has weathered successfully the economic disturbances of the past few years. The four-course rotation was converted to a six- or seven-course one by extending the period of temporary grass to two or three years. This had the effect of reducing the labour bill while still maintaining a high individual rate of

pay and a high total output of corn. It further effected economies in manures and led to the development of stock-raising in the poorer and more isolated districts, and of arable dairying in the vicinity of towns. . . . .

Under every system of farming a certain complement of labour is necessary, and it is the first principle of success that labour should be fully and usefully employed at all seasons. Hence, it is probably unprofitable as well as undesirable that arable land under almost any set of circumstances should be reduced beyond a certain limit.

Practice Determined by Prices.

In considering measures that might be taken to mitigate the present economic stress, it is useless to ignore the fact that practice must be determined by prices. We may all agree that the best thing for the country is to maintain or enlarge the area under tillage. We must, however, count the cost. Tillage needs much capital and involves heavy risks, and one of the chief disabilities of the average farmer is the lack of ready access to capital. What is to be done? A committee of German specialists, reporting to their Government in 1915, estimated that the expansion of German agriculture in the past was due to—

The use of artificial manures	50 per cent.
The cultivation of more prolific crops	30 per cent.
Other measures	20 per cent.
	100 per cent.

Development along these lines is a matter of continued evolution and education —education correlated with practice. In the past, education has aimed chiefly at increasing production without much regard to cost. Farmers and educationists must, alike, get down to £ s. d. It is of little real value to know that the use of artificial manures or of a particular variety will increase the crop beyond that of standard practice. Unless the cost of the basic crop is known one cannot say that the innovation is profitable. Farming is a business to be judged by the financial results. Just, however, as recording of food and milk in the case of dairy cows has shown that appreciable economies can be effected, so cost records in regard to crops would stimulate farmers to investigate possible sources of leakage. . . . .

SHEEP—UNIFORMITY OF TYPE AND CHARACTER.

In making up the flock, be it for purebred breeding or for commercial breeding, it is essential that the owner should first of all strive to obtain a flock of uniform type and character. The reason is obvious; from such a flock the lambs are uniform, and afford greater attraction to the purchaser, whether they be sold for stud purposes, or for commercial purposes or for slaughter. Eliminate every ewe that gives any indication of coarse breech wool, and bad symmetrical conformation, for such produce, generally speaking, lambs of a similar character. The butcher, who becomes the final purchaser, naturally gives preference to the more symmetrical carcase, and the one that has the larger proportion of the more valuable parts, as compared with the inferior joints.

The selection of the sires for the flock is, of course, a matter of very vital importance, and we would strongly urge upon every flockowner who is contemplating purchasing a sire or sires for his flock, only to do so after a most careful and critical examination. The nearer perfect the individual sire is the better, and the greater will be its produce. In many districts, it is the practice for the commercial flockowner to run some six or more rams together in his flock. In such cases, the better course of procedure is to purchase the whole of the sires from one flock. There is a greater likelihood of getting a uniform lot of lambs by so doing. Unfortunately, our past experience has time after time shown an utter disregard for this. We have known large flockowners buy from as many breeders as they require rams, and year after year we have heard the same remark: "My lambs are not as they should be; they are all of different character." How can it be otherwise? We urge this, as we have urged it in many years past; either the purchasing flockowner should go out of the business, or secure the whole of his run of rams or ram lambs from one individual flockowner.—"The Farmers' Express."

A BLOWFLY AND SOME PARASITES.

By G. H. HARDY, Walter and Eliza Hall Fellow in Economic Biology, Queensland University.*

The subject-matter of this article is based upon a series of comprehensive experiments that space does not permit me to deal with here, but these experiments have brought to light many factors that bear upon the subject of parasitism in general and upon economic problems in particular.

The blowfly dealt with is the common blue-green *Lucilia*, which is one of the worst pests that the stock owner has to contend with. The parasites are three in number, *Mormoniella* (well known under the name *Nasonia*), *Paraspilomicrus*, and *Tachinaephagus* (the last is also called *Australencyrtus*). All three are doing valuable work in reducing diptera, notably blowflies and houseflies. These parasitic wasps are very small indeed, and as many as forty can be reared from a single puparium, but usually an average of seven emerge from a single puparium of *Lucilia*.

In my experiments I pitted *Mormoniella*, which lives forty days or more, against the puparia of this fly *Lucilia*, which persists in the pupal stage from about seven to fifteen days, according to the seasons of the year. A batch of parasites was induced on consecutive days to parasitise hosts of graduated ages. The process was repeated with several other batches of parasites with the relation to the hosts suitably altered.

From results so far obtained the conclusions drawn are—

(1) The parasite does not deposit eggs until it is over a day old, although it repeatedly performs the action of so doing.

(2) During the first few days the eggs of the wasp, developing in the ovaries, mature slowly and are therefore deposited at rare intervals. Under these circumstances eggs cannot be deposited at every attempted deposition.

(3) Then follows a period lasting about a fortnight or perhaps longer when the eggs deposited range up to several hundreds. This is the period of maximum utility.

(4) Approaching a month old, depositions become rare again and finally cease.

(5) The puparium itself must be over a day old before it can be effectively parasitised. Parasitic eggs may be dropped therein but these do not prevent the ultimate emergence of the fly. This is the first immunity period of the host.

(6) During the last two days of the pupal period, that is for the two days prior to the time when the fly is due to emerge, if eggs are deposited within the puparium they will not prevent the fly emerging. This is the second period of immunity.

From these conclusions it can be readily realised that failure to effect parasitism may be due to—

(*a*) Failure to deposit eggs.

(*b*) Eggs being deposited during two periods of immunity, one when the puparium is too young, lasting about a day, the other when the puparium is too old, lasting about two days.

As these figures are based upon a seven-day pupal period, only four days are left during which effective parasitism can take place.

So far we have dealt with *Mormoniella*, a wasp of the family *Chalcididae* and the grub of which feeds between the hard outer covering, the puparium, and the living pupa contained therein.

Paraspilomicrus is a wasp of the family *Proctotrupidae*, the adult is short lived, lasting about ten days, and the grub lives within the developing pupa of the fly, not outside it like the larva of *Mormoniella* does.

Mormoniella has a developing period lasting about fifteen days, whilst *Paraspilomicrus* takes over twice as long to reach the imago stage, consequently if

* From an address delivered to the Entomological Society, Brisbane, 31st October, 1924.

the same host is effectively parasitised by both these wasps, only the progeny of *Mormoniella* can persist. Where *Mormoniella* is not effective on puparia under a day old, *Paraspilomicrus* can parasitise a puparium a few hours after pupation has taken place.

Some of these facts, tested by experiment, explain why *Paraspilomicrus* is the rarer insect, nevertheless it appears to exist under conditions that *Mormoniella* cannot, and therefore it would play a part of special significance in the economy of nature.

The third parasite, *Tachinaephagus*, is another wasp of the family *Chalcididae*, but it has a system of attack differing from that of the other two. It deposits its eggs in the maggot of the fly, so by the time the host forms its puparium either eggs or grubs are already there.

It is necessary to explain here another of the facts discovered during my experiments on blowflies. There is a period in the life of the fly starting when the maggot has become full grown and finishing when the puparium forms. It is called the prepupal period. The wonderful part about this stage of the fly's metamorphosis is in the elasticity of its duration.

There may be breeding, a batch of maggots originally deposited by the same parent at the same time and living under the same set of conditions. These maggots will start the prepupal period together. On the third day following, the puparia of one will form and the others will do likewise in fairly quick succession, so that on the seventh day the final puparium will be formed. If, however, this same batch of maggots be placed under another set of conditions, although the first to pupate will do so on the third day, the others will extend the difference in the time taken to form the puparium, and the final one may achieve it on the sixtieth day.

This phenomenon is found to occur under natural conditions with most of the genera of blowflies and it is regarded as being due to an inherent characteristic of the individual whereby no two maggots of any one batch, deposited by the same parent, have the prepupal period of exactly the same duration.

We have seen under the account of *Mormoniella* that there are conditions rendering blowflies immune against that parasite, and the natural question arises whether there may not also be a property of immunity involved in this phenomenon of varied prepupal duration?

By experiment it has been ascertained that eggs of *Tachinaephagus* deposited in maggots between one and seven days prior to the formation of the puparium result in the emergence of parasites. Nothing is known beyond this and when projected experiments are carried out, giving the relationship with maggots that pupate three or more weeks after parasitisation takes place, it will be interesting to know whether the grub of the wasp is capable of overcoming this long wait till the puparium is formed, or if the host is immune under such conditions.

There is the possibility of yet another result; under these circumstances, the action of the grub may prevent the maggot from pupating and the failure to pupate may react upon the parasite, causing this, too, to die.

The question of properties of which this is an example—properties that bring about mutual destruction of parasite and host—has not advanced sufficiently far to warrant a full account being given. That there are such factors, however, acting under natural conditions, seems only too certain, and it is possible that mortality amongst parasites, preventing them carrying out their work of destruction more efficiently than they do, is largely owing to some such compensating factor.

These conditions appear prevalent at definite periods of the year, as certain seasons bring about the reduction of parasites that is not necessarily in conformity with the reduced breeding of the flies.

Hypothetically it may be put this way. *Mormoniella* breeds through the Brisbane winter. Certain species of blowflies pass this season in the puparium. The parasite may attack such a puparium in the arrested state of development and the grub starts feeding, but owing to the lack of development in the host, it would fail to complete its feeding and thus succumb to the hibernating condition of the host whilst doing sufficient damage to prevent the host completing its metamorphosis.

Again, though perhaps less likely, a similar result might also be caused by flies that pass their pupal stage very quickly, say four days, when the rapidity of the development may adversely affect the parasite. It is on such hypotheses, which are originally based on observations, that new experiments are to be planned.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF SEPTEMBER, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING SEPTEMBER, 1924 AND 1923, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Sept.	No. of Years' Records.	Sept., 1924.	Sept., 1923.		Sept.	No. of Years' Records.	Sept., 1924.	Sept., 1923.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	0·58	23	2·42	...					
Cairns	1·65	42	4·08	0·05	Nambour	2·50	28	1·83	1·14
Cardwell	1·43	52	0·57	0·23	Nanango	1·92	42	2·18	1·30
Cooktown	0·57	29	0·89	...	Rockhampton ...	1·29	37	1·83	0·45
Herberton	0·47	37	1·44	0·07	Woodford	2·22	37	2·12	1·87
Ingham	1·25	32	1·84	0·04					
Innisfail	3·58	43	2·61	0·78					
Mossman	1·17	15	2·19	...					
Townsville	0·78	53	1·21	0·03	*Darling Downs.*				
					Dalby	1·76	54	3·50	1·65
Central Coast.					Emu Vale	1·90	28	3·52	1·36
					Jimbour	1·59	36	3·03	1·44
Ayr	1·52	37	0·24	1·38	Miles	1·46	39	2·87	1·48
Bowen	0·81	53	0·44	...	Stanthorpe ...	2·45	51	3·84	1·54
Charters Towers ..	0·77	42	0·30	0·01	Toowoomba ...	2·23	52	3·49	1·10
Mackay	1·62	53	0·89	...	Warwick	1·89	59	3·09	1·20
Proserpine	2·19	21	0·48	0·05					
St. Lawrence ...	1·31	53	1·36	...					
					Maranoa.				
South Coast.					Roma	1·56	50	1·62	1·81
Biggenden	1·67	25	2·00	1·21					
Bundaberg	1·77	41	2·03	1·80	*State Farms, &c.*				
Brisbane	2·07	73	1·16	1·21					
Childers	1·93	29	2·78	1·21	Bungeworgorai ...	1·32	10	1·78	1·47
Crohamhurst ..	2·71	30	2·12	1·45	Gatton College ...	1·69	25	2·65	0·69
Esk	2·28	37	2·35	0·84	Gindie	1·11	25	1·24	2·74
Gayndah	1·55	53	3·20	0·50	Hermitage ...	1·67	18	2·62	1·00
Gympie	2·17	54	2·39	1·61	Kairi	0·61	10	0·72	0·02
Glasshouse Mts. ...	2·29	16	...	1·73	Sugar Experiment				
Kilkivan	1·72	45	3·17	0·52	Station, Mackay	1·52	27	...	...
Maryborough ...	1·98	53	3·57	2·23	Warren	0·66	10	1·40	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for September, 1924, and for the same period of 1923, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, State Meteorologist.

CO-OPERATIVE ASSOCIATIONS ACT—ADDITIONAL REGULATIONS.

Additional Regulations have been issued under the Primary Producers' Co-operative Associations Act providing that, upon any company previously registered under the Industrial and Provident Societies Act or the Companies Act becoming registered under the Primary Producers' Co-operative Associations Act and becoming an Association, all the assets, liabilities, &c., of such abovementioned company shall become vested in and imposed upon the said Association, and any right of action, agreement, undertaking, mortgage, &c., made, given, or entered into by the said company may be prosecuted and enforced by or against the said Association.

TWO VALUABLE FODDER TREES.

By C. T. WHITE, F.L.S., Government Botanist.

I have long been of the opinion that one of the surest ways to combat the serious droughts, that Queensland in conjunction with most other parts of Australia periodically suffers, is by the systematic planting of drought resistant fodder trees. Trees, owing to their extensive and usually deep root systems, once established have an advantage as drought resisters over grasses and herbage. Two trees commonly planted in Queensland gardens as shade trees have been brought under my notice recently as trees of considerable value as food for stock.

One of these trees is the Phytolacca or Bella Sombra tree (*Phytolacca dioica*) and the other the mis-called "Portugese Elm" (*Celtis sinensis*).

(a) Phytolacca or Bella Sombra Tree *(Phytolacca dioica).*

Description.—A large rapid-growing soft-wooded tree; leaves a rather bright glossy green, long-stalked, the stalk often purplish, lamina or blade of leaf usually oblique at the base, *i.e.*, one side longer than the other. Flowers greenish white in long slender racemes ("spikes") of six to nine inches or even longer, the male and female flowers on distinct trees. Fruits densely clustered along the spikes, depressed globular.

Native Country.—A native of South America; widely cultivated in the sub-tropics as a shade tree.

Botanical Name.—From the Greek *phyton,* a plant, and the Italian *lacca,* lac or varnish; from the berries or fruit of some species yielding a red colour like lac.

Fodder Value.—In his "Comprehensive Catalogue of Queensland Plants" the late F. M. Bailey remarks, "Cows will devour the stem of this tree when cut down as they do our bottle tree." This, however, is a very wasteful method of utilising a very valuable fodder tree, and I was therefore glad to hear recently from my friend Professor S. B. J. Skertchly of the use of this tree as a fodder at Purga, near Ipswich. I later visited the farm of Mr. Dick, at Purga, and took the accompanying photographs of the tree in full foliage. Mr. Robert Dick kindly gave the following particulars regarding the methods of using this tree as a fodder. Mr. Dick stated: "As Queenslanders know, nine out of every ten springs come in dry, and our way of helping the calves over the spring is to prune the Phytolacca trees of a few branches every day. These branches are anything up to 12 feet long (one year's growth). Whether dry or not we always prune in the spring to have a strong crop of shoots next year. One cannot grasp the effect of the pruning unless seen. I may say we have known a single shoot of one year's growth to be 4 inches across at the butt, to attain 16 feet in length, and to weigh 28 lb.; of course cattle would not eat all of such a big shoot as this, but would eat all the leaves and chew the stem down to about where it was 2 inches thick. These trees make very rapid growth here. A number of young under-hanging shoots are always left to bear flowers and fruits."

As stated by Mr. Dick the tree is a rapid grower. The accompanying photograph represents a specimen two years old, about 12 feet high, and measuring 1 foot 5 inches in girth 3 feet from the ground and 2 feet 4 inches in girth at the base. The large specimen of which a photograph is given was planted in 1901, and at the present time has a girth of 8 feet 9 inches at about 3 feet from the ground. Its large spread can be seen from the photograph.

From the above it will be seen that the Phytolacca is a very valuable tree for planting in Queensland as a fodder.

(b) *Celtis sinensis.* Nettle Elm, mis-called "Portuguese Elm."

Description.—A deciduous leafy tree not usually very tall and with a large spreading head. Leaves glossy green above, somewhat paler beneath, the base usually but not always very oblique (*i.e.*, lopsided), mostly 1½-2 inches long and 1 to 1½ inches broad, borne on a stalk of about one-third of an inch. The edge

PLATE 109.—PHYTOLACCA OR BELLA SOMBRA TREE.

1.—Tree showing fine growth, the result of regular pruning.

2.—Young tree, two years old.

3.—Shoot of one season's growth; height, 15 feet.

PLATE 110.—FLOWERING TWIG (MALE) OF THE PHYTOLACCA OR BELLA SOMBRA TREE.

PLATE 111.—CELTIS SINENSIS, SO-CALLED "PORTUGUESE ELM."
A Valuable Fodder Tree.

bluntly toothed in the upper part of the leaf. Flowers insignificant. The fruits are small rounded drupes (berries) borne on slender stalks of about one-quarter of an inch long in the axils of the leaves, yellow when ripe and about one-quarter of an inch in diameter.

Native Country.—China; a widely spread tree in the Orient.

Fodder Value.—Our attention was first drawn to this tree as a fodder by Mr. E. Everett, Inspector of the State Advances Corporation at Gayndah, who, in a letter dated 31st December, 1923, wrote:—

"I would like to draw attention to a splendid fodder tree which grows along the banks of the river at Gayndah and in some instances is used as an ornamental tree. I have been told that the name of the tree is 'Portuguese Elm.' It sheds its leaves annually but has a most luxuriant growth of leaves from about October to June, and if these trees were planted along the river and creek banks there would never be any occasion to lose a beast from starvation during those months in the most severe drought. The trees are hardy, but of course require protection until they grow out of reach of horses and cattle. Small trees can be got by thousands under the trees, but cattle and horses never let them grow high when within their reach. I have had experience with Currajong, Oak, and Bottle tree, which will keep cattle alive for a little while, but they will thrive and improve on Portugeuse Elm. If any officer of the Agricultural Department passes through Gayndah at any time I should much like to show him these trees and give him any information I possess on the matter."

The point brought forward by Mr. Everett is a very important one, and I fully endorse his opinion that the planting of fodder trees would in the end go a long way to mitigating the losses of stock that occur during every drought period.

Celtis australis is another species that is grown in Queensland gardens but to a less extent than *C. sinensis.* Of *C. australis* Sir George Watt, in his "Dictionary of Economic Products of India," says, "The tree is largely planted for fodder, cows fed on the leaves are supposed to give better milk." This species would no doubt stand greater degrees of cold than *C. sinensis* and would be a valuable tree for the Darling Downs, where some fine trees are already to be found.

Botanical Name.—Celtis, one of the names anciently given to the Lotus. Tounefort first applied the name to the modern genus which may be said to resemble both in the fruit and foliage the shrubby Lotus of the ancients (Loudon, Dictionary of plants); *sinensis,* a native of China, from the Latin *Sinæ,* an Oriental people.

Common Name.—Though the tree is a native of China, in Queensland the tree is known almost everywhere under the name of "Portuguese Elm." This arose, no doubt, from its confusion with another species of *Celtis* (*C. australis*) cultivated in the cooler parts of the State, and a native of Southern Europe.

Identification of the Tree.—The present tree is common in Queensland gardens and has variously passed as *Celtis australis, C. Krausiana,* and *C. occidentalis,* but as I could not fit it in with any of these species, I sent specimens to the Director, Arnold Arboretum, Boston, U.S.A., and obtained the reply that the tree was *C. sinensis,* a native of China, and widely spread in the Orient.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

The broad-leaved Leopard tree (*Flindersia collina*) is a conspicuous species in the "scrubs" where it is found, as the bark is greenish grey in colour and is shed in rounded or irregularly oval pieces which leave very prominent depressions. The bark is very thin, measuring ⅜ inch on a tree with a stem diameter of 2 feet 3 inches. The trees attain a height of about 100 feet. The wood is yellow and hard. The species is mostly found in the drier "scrubs," such as those of Rosewood, Nanango, &c. It has been found as far north as Childers and as far west as Taroom. In New South Wales it has been found in the Tweed River district.

Photo. by Authors.]

PLATE 112.—BROAD-LEAVED LEOPARD TREE (*Flindersia collina*).
A Tree in the Nanango District.

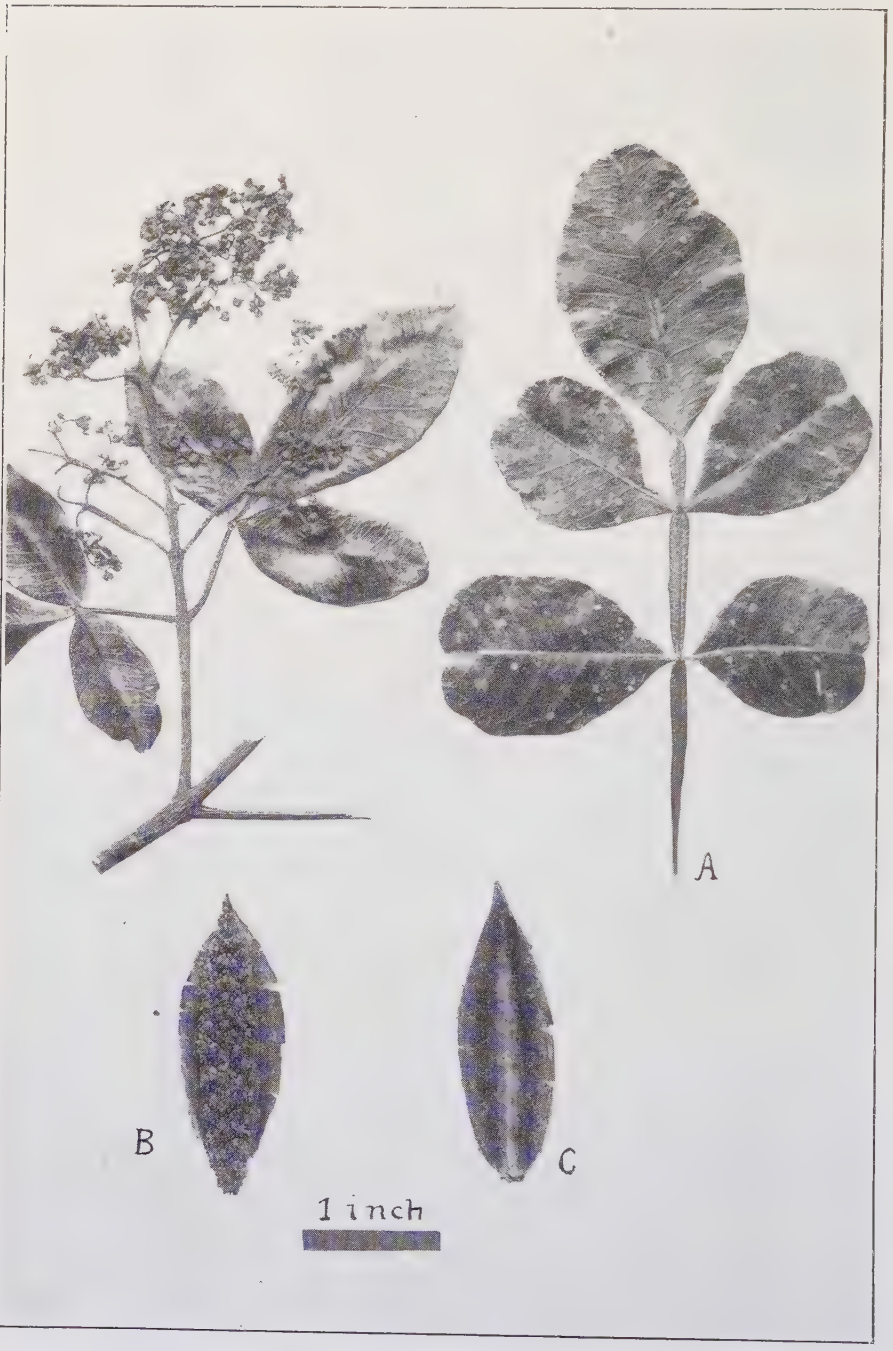


Photo.: Dept. Agric. and Stock.]

PLATE 113.—THE BROAD-LEAVED LEOPARD TREE.

A.—Seedling or coppice leaf. B.—Capsule valve, showing back or exterior.
C.—Capsule valve, showing interior.

EGG-LAYING COMPETITIONS.

N.U.P.B.A., ZILLMERE.

Three thousand six hundred and eighty seven eggs were laid during September, the average per bird being 21·7—with 21·8 in the White Leghorn, 21·6 in the Black Orpington, and 22·4 in the Other Varieties sections.

The health of the birds has been good, but broodiness has interfered with the laying of some of the pullets. Nos. 109, 112, 116, 122, 129, 134, 135, 136, 145, 158, 164, 167, and 169 being affected.

White Leghorns.

Pen No.	Owner.	Sept.	Total.
104	Oakleigh P. F. ..	28	153
21	Hodge, A.	27	134
105	Oakleigh P. F. ..	25	134
97	Sommerlad, K. A. ..	23	133
20	Hodge, A.	24	131
82	Wakefield, W. ..	24	129
84	Wakefield, W. ..	24	129
19	Hodge, A.	23	125
78	Newberry, M. F. ..	23	125
95	Williams, G.	25	122
6	Pember, H. T. ..	23	121
12	Berry, W. J.	25	120
76	Newberry, M. F. ..	22	120
89	Duff, R.	23	120
88	Duff, R.	24	119
90	Duff, R.	25	119
103	Oakleigh P.F. ..	11	116
79	Purnell, J. E. G. ..	24	115
16	Webster, J. T. ..	25	113
48	Turner, R. C. J. ..	24	111
41	Cole, R. C.	24	109
68	Kidd Bros.	24	109
25	Britten, H. T. ..	23	108
64	Tracey, E.	22	108
101	Walters, A. S. ..	25	107
73	Raymond, E. C. ..	23	107
92	Hodgson, C. A. ..	21	107
100	Walters, A. S. ..	25	107
46	Turner, R. C. J. ..	22	106
11	Berry, W. J.	25	105
60	Staib, A.	14	105
61	Carinya P.F. ..	26	104
174	Grenier, S. L. ..	25	103
1	Williams, F. J. ..	22	101
39	Fraser, H.	23	101
58	Staib, A.	24	101
93	Hodgson, C. A. ..	15	100
13	Marks, G.	24	99
38	Fraser, H.	17	99
15	Marks, G.	26	98
40	Cole, R. C.	22	98
56	Hutton, J.	24	98
65	Tracey, E.	25	98
80	Purnell, J. E. G. ..	22	98
51	Earl, J.	24	96
99	Sommerlad, K. A. ..	23	96
74	Raymond, E. C. ..	22	95
106	Howard, W. L. ..	25	97
87	Enroh Pens	21	90
108	Howard, W. L. ..	23	90
45	Adams, P. F.	22	89
98	Sommerlad, K. A. ..	22	88
10	Berry, W. J.	24	85
86	Enroh Pens	19	85
44	Adams, P. F.	21	82
47	Turner, R. C. J. ..	25	82
107	Howard, W. L. ..	20	82
59	Staib, A. (Replace, 13-6-24)	22	75
62	Carinya P. F. ..	21	75
69	Kidd Bros.	23	75
63	Carinya P. F. ..	25	74
26	Britten, H. T. ..	19	72
5	Pember, H. T. ..	25	71
83	Wakefield, W. ..	16	69
172	Grenier, S. L. ..	23	66
34	Chapman, J. L. .	22	65
91	Hodgson, C. A. ..	22	64
17	Webster, J. T. ..	1	21
94	Williams, G.	3	7
30	Campbell, M. H. ..	25	B123
67	Kidd Bros.	22	B122
71	Wilson, J. R.	26	B119
35	Chapman, J. L. ..	23	B116
75	Raymond, E. C. ..	23	B113
52	Rogers, G. E.	22	B112
28	Campbell, M. H. ..	22	B110
29	Campbell, M. H. ..	22	B109
42	Cole, R. C.	22	B107
49	Earl, J.	20	B105
14	Marks, G.	26	B103
77	Newberry, M. F. ..	23	B80
72	Wilson, J. R.	22	B78
33	Hindes, W. and G. W.	21	B75
24	Neil, A.	18	B67
173	Grenier, S. L. ..	14	B48
7	Sturman, H.	10	B38
85	Enroh Pens	22	BE137
70	Wilson, J. R. ..	28	BE129
55	Hutton, J.	27	BE128
66	Tracey, E.	24	BE123
81	Purnell, J. E. G. ..	25	E120
31	Hindes, W. and G. W.	27	BE118
102	Walters, A. S. ..	23	E116
54	Rogers, G. E.	11	E114
27	Britten, H. T. ..	20	E112
32	Hindes, W. and G. W.	22	BE110
18	Webster, J. T. ..	23	BE109
53	Rogers, G. E. ..	25	E106
36	Chapman, J. L. ..	17	E100
57	Hutton, J.	21	BE100
37	Fraser, H.	26	BE95
22	Neil, A.	16	BE94
9	Sturman, H.	25	BE93
8	Sturman, H.	22	E92
23	Neil, A.	19	BE90
2	Williams, F. J. ..	22	E89
3	Williams, F. J. ..	22	E86
96	Williams, G. ..	23	BE86
4	Pember, H. T. ..	24	E79

B signifies bird under standard weight.
E signifies egg under standard weight.

BLACK ORPINGTONS.

Pen No.	Owner.	Sept.	Total.	Pen No.	Owner.	Sept.	Total.
126	Brotherton, T. ..	25	155	148	Raymond, E. C. ..	20	97
127	Walters, E.	28	152	112	Wilson, W. R. ..	22	96
156	Hutton, J.	27	145	134	Dennis, C.	16	94
130	Rogers, G. E.	24	144	152	Enroh Pens	22	84
110	Fanning, T.	18	138	118	Chaille, H. M. ..	10	65
129	Walters, E.	22	136	121	Potter, J.	11	56
116	Campbell, G. L. ..	16	134	141	Pryde, J. (Replace, 7-7-24)	20	53
144	Cummings, F. P. ..	22	133				
111	Fanning, T.	25	130	124	Brotherton, T. H. (Replace, 30-8-24)	25	27
113	Wilson, W. R. ..	22	129				
143	Cummings, F. P. ..	23	129	119	Chaille, H. M. ..	21	B102
131	Rogers, G. E. ..	24	127	114	Wilson, W. R. ..	27	E153
139	Pryde, J.	24	125	142	Cummings, F. P. ..	28	E140
155	Hutton, J.	19	125	115	Campbell, G. L. ..	20	E138
133	Dennis, C. C. ..	21	123	147	Everlay P. Y. ..	27	E138
150	Raymond, E. C. ..	28	121	138	Adams, W. S. ..	24	BE136
145	Everlay P. Y. ..	6	113	154	Hutton, J.	27	E135
120	Chaille, H. M. ..	21	111	117	Campbell, G. L. ..	17	BE131
125	Brotherton, T. H. ..	19	109	109	Fanning, T.	22	E127
153	Enroh Pens	24	109	123	Potter, J.	25	E121
128	Walters, E.	18	105	136	Adams, W. S. ..	21	E110
132	Rogers, G. E.	20	100	140	Pryde, J.	27	E105
149	Raymond, E. C. ..	23	100	122	Potter, J.	17	E95
137	Adams, W. S. ..	28	97	151	Enroh Pens	23	E85
146	Everlay P. Y. ..	21	97	135	Dennis, C. C.	16	E73

OTHER VARIETIES.

169	Pryde, J. (Lang.) ..	25	116	164	Walters, A. S. (B.R.)	10	69
159	Messines P. F. (R.I.R.)	23	111	176	Everlay P. Y. (B.L.)	22	58
160	Ollier, T. C. (B.R.) ..	21	98	163	Walters, A. S. (B.R.) (Replace, 3-7-24) ..	22	50
168	Forsyth, W. H. (S.W.)	22	98				
161	Ollier, T. C. (B.R.) ..	25	97	170	Pryde, J. (Lang.) (Replace, 23-6-24)	21	B69
167	Forsyth, W. H. (S.W.)	9	97				
180	Ferguson, J. and Son (B.L.)	26	95	175	Everlay P. Y. (B.L.)	25	E106
				162	Ollier, T. C. (B.R.) ..	28	E92
158	Messines P. F. (R.I.R.)	17	94	171	Pryde, J. (Lang.) (Replace, 21-6-24)	25	E72
165	Walters, A. S. (B.R.)	20	89				
166	Forsyth, W. H. (S.W.)	17	84	177	Everlay, P. Y. (B.L.)	20	E61
157	Messines P. F. (R.I.R.)	24	83	179	Ferguson, J., and Sons (B.L.)	24	54
178	Ferguson, J., and Sons (B.L.)	23	71				

B signifies bird under standard weight.
E signifies egg under standard weight.

C. KIDD, Hon. Secretary.

N.U.P.B.A. TOOWOOMBA SUB-BRANCH.

Single Test Egg-laying Competition—Scores to 30th September, 1924.

BLACK ORPINGTONS.

Pen No.	Owner.	Sept.	Total.	Pen No.	Owner.	Sept.	Total.
2	Hutton, J.	20	142	23	Carr, T. J.	25	131
9	Everlay P. Farm ..	24	140	41	Wilson, W. R. ..	25	131
51	*Holmes, R.	27	138	28	Williams, W. D. ..	19	130
52	Holmes, R.	20	137	33	Potter, Jas.	21	130
45	Stephens, H. B. ..	26	136	20	Maund, Mrs. L. ..	23	129
42	Wilson, W. R. ..	25	133	5	Walters, E.	24	125
24	*Carr, T. J.	22	132	7	*Adams, P. F. ..	16	122
29	*Adams, W. S. ..	19	132	11	Webb, A. W. ..	5	122

* Signifies bird laying under-weight eggs.

Black Orpingtons—*continued.*

Pen No.	Owner.	Sept.	Total.	Pen No.	Owner.	Sept.	Total.
15	Macfarlane, K. ..	22	122	21	Walsh, H.	20	99
40	Rogers, G. E. ..	21	121	44	Smith, E. R.	12	95
10	Everlay P. Farm ..	25	120	48	Head, J.	25	95
22	*Walsh, H.	10	120	31	*Radford, G.	2	92
49	*Ollier, T. C.	19	120	37	Short, J. W.	15	92
32	Radford, G.	22	118	16	*Macfarlane, K. ..	25	90
3	McLay, J. A. ..	21	116	14	Burns, R.	22	84
39	Rogers, G. E. ..	23	116	34	*Potter, J.	23	82
43	Smith, E. R.	21	116	46	Stephens, H. B. ..	21	82
50	Ollier, T. C.	25	116	47	*Head, J.	19	80
19	Maund, Mrs. L. ..	23	111	4	McLay, J. A. ..	23	74
25	Stephens, Moss ..	23	109	8	Adams, P. F. ..	23	73
6	Walters, E.	21	107	38	Short, J. W.	24	73
30	Adams, W. S. ..	26	107	26	Stephens, Moss ..	23	70
13	Burns, R.	15	105	35	Rivett, R. R. ..	7	60
1	Hutton, J.	21	104	18	*Champion, S. H. K. ..	20	59
36	Rivett, R. R.	23	103	17	*Champion, S. H. K. ..	1	40
27	Williams, W. D. ..	20	102	12	Webb, A. W.	0	16

Other Varieties.

60	Le Pla, A. W. (R.I.R.)	26	144	71	Brand, V. (R.I.R.)	17	90
70	*Dibbs, H. (Lang.) ..	29	142	54	Warrian, C. G. (Rock.)	19	89
53	Warrian, C. G. (Rock.)	26	134	69	Dibbs, H. (Lang.) ..	9	89
66	*Becker, W. (Lang.)	23	130	55	Carr, T. J. (S. W'dotte) ..	17	61
59	Le Pla, A. W. (R.I.R.)	20	129	63	Rafter, J. J. (B.L.) ..	18	60
57	*Maund, Mrs. L. (Col. W'dotte.) ..	26	123	72	Brand, V. (R.I.R.) ..	19	60
65	*Becker, W. (Lang.)	25	115	58	Maund, Mrs. L. (Col. W'dotte) ..	9	57
61	Harrington, J. (B.L.)	20	108	67	Everlay P. Farm (B.L.)	17	44
56	*Carr, T. J. (S. W'dotte)	24	107	62	*Harrington, J. (B.L.)	1	42
68	*Everlay P Farm (B.L.)	20	101				
64	Rafter, J. J. (B.L.)	20	91				

White Leghorns.

132	*Short, J. W.	26	155	125	*Maurer, G.	24	111
114	Cole, R. C.	28	144	109	*Enroh Pens	22	110
112	*Chapman, S.	26	143	75	Wilson, W.	20	109
131	*Short, J. W.	24	140	85	Rivett, R. R. ..	27	109
105	Hutton, J.	24	139	97	Hunt, G.	24	108
124	King, J. E.	24	132	117	Goggins, J.	24	107
73	Dippell, D.	26	131	77	Howard, R. B. ..	20	106
110	*Enroh Pens	21	129	95	Adams, W. S. ..	23	106
74	Dippell, D.	21	129	87	Warrian, C. G. ..	22	105
121	Grant, W.	24	128	99	*Newton, J. W. ..	22	105
91	Stilton, G.	25	127	108	Adams, P. F. ..	18	105
106	*Hutton, J.	23	126	86	Rivett, R. R.	24	104
111	Chapman, S.	23	126	96	Adams, W. S. ..	24	104
78	Howard, R. B. ..	12	125	116	Taylor, J.	24	103
122	Grant, W.	23	125	128	Stilton, E. J.	19	101
123	King, J. E.	23	121	76	Wilson, W.	21	99
129	Manning, H. G. ..	22	121	81	Smith, E. R.	24	96
118	Goggins, J.	28	120	104	*Fallon, P. J.	14	95
93	Williams, D. W. ..	22	119	107	Adams, P. F.	23	94
113	Cole, R. C.	27	117	130	*Manning, H. G. ..	27	94
88	*Warrian, C. G. ..	26	115	80	McBean, S.	22	93
100	*Newton, J. W. ..	23	115	120	Rogers, G. E.	24	93
115	Taylor, J.	23	114	79	*McBean, S.	26	90
101	Turner, R. C. J. ..	25	112	83	Carinya P. Farm ..	24	90
103	*Fallon, P. J.	18	111	90	Ellis, L. E.	24	90

* Signifies bird laying under-weight eggs.

White Leghorns—*continued.*

Pen. No.	Owner.	Sept.	Total.	Pen. No.	Owner.	Sept.	Total.
126	Maurer, G.	23	90	119	Rogers, G. E.	21	81
127	Stilton, E. J.	18	90	94	Williams, D. W. ..	20	79
102	Turner, R. C. J. ..	21	89	89	Ellis, L. E.	21	78
92	Stilton, G.	22	88	98	Hunt, G.	18	64
84	Carinya P. Farm ..	23	86	82	Smith, E. R.	23	57

* Signifies bird laying under-weight eggs.

Grand Totals for September.

Black Orpingtons	1,027
Other varieties	387
White Leghorns	1,363
	2,777

Average: 21·04 eggs per bird.

Grand Totals to Date.

Black Orpingtons	5,499
Other varieties	1,966
White Leghorns	6,493
	13,958

Average: 17·62 eggs per bird per month for six months.

JOSEPH GARNER, Government Supervisor.

BRONZY ORANGE SUCKING BUG.

It has been brought to the notice of the Department of Agriculture that the Bronzy Orange Sucking Bug is presenting itself in large numbers generally throughout the North Coast fruit district as it did this time last year. As this insect has been proclaimed a pest under the Diseases in Plants Act, every citrus grower in whose orchard this pest is present must take one of the following precautions immediately:—

(1) Cyanide the trees; or (2) drive every immature insect from the trees on to the ground by means of tapping the branches of the trees with a padded stick, so as to dislodge the insects harbouring thereon and cause them to fall to the ground, from which they will be unable to return to the trees provided a bandage is first placed round the trunk of the tree and is then smeared with tanglefoot; or (3) spray thoroughly with a contact spray such as an oil emulsion, resin and soda wash, nicotine sulphate, or Boulli labordi.

These sprays will kill quite a number of insects and will cause others to fall to the ground from where they are unable to return to the trees, provided a bandage smeared with tanglefoot, as recommended, is placed round the trunk of the tree. If these simple precautions are taken by every grower without delay the damage done by these insects will be reduced to a minimum, but if, on the other hand, the bugs are allowed to mature, the mature insects will produce countless thousands of eggs with which to carry over the pest from season to season. Mature (viz., winged) insects must be gathered and destroyed by hand. The best time to do this is in the early morning as they are then sluggish and do not take wing readily. The Agricultural Chemist has supplied the following formulæ for Boulli labordi and tanglefoot:—

Dissolve 8 oz. of resin, 3 oz. caustic soda, 6 oz. methylated spirits, and 5 oz. liquid ammonia in a quart of water. Heat if necessary to dissolve the resin, and add water to make up four gallons.

To make tanglefoot:—(1) Melt together 8 parts resin, 4 parts turpentine, 4 parts rapeseed oil, and half a pint of honey; or

(2) Boil to a thick paste 1 lb. of resin, 3½ oz. linseed oil, and 3½ oz. molasses; or

(3) Carefully boil linseed oil until it becomes syrupy and tack on cooling.

PLATE 114.—A SECTION IN THE AUSTRALIAN PAVILION, EMPIRE EXHIBITION, WIMBLEY PARK, ENGLAND.

PLATE 115.—HOW A REPRESENTATION OF QUEENSLAND'S NEW INDUSTRY WAS STAGED AT WEMBLEY.

PLATE 116.—QUEENSLAND TROPICAL PRODUCE AT WEMBLEY.

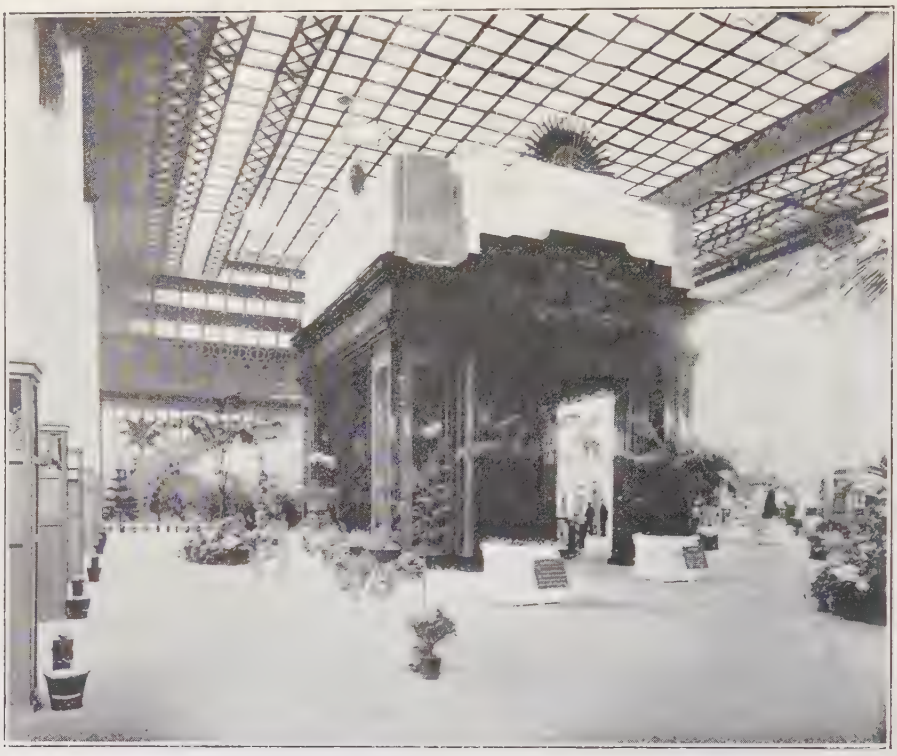


PLATE 117.—OUR WEALTH IN WOOD ILLUSTRATED IN THE AUSTRALIAN PAVILION, WEMBLEY.

The Central Trophy is made entirely of polished Australian timbers. The world is interested in Australia's unique forest resources.

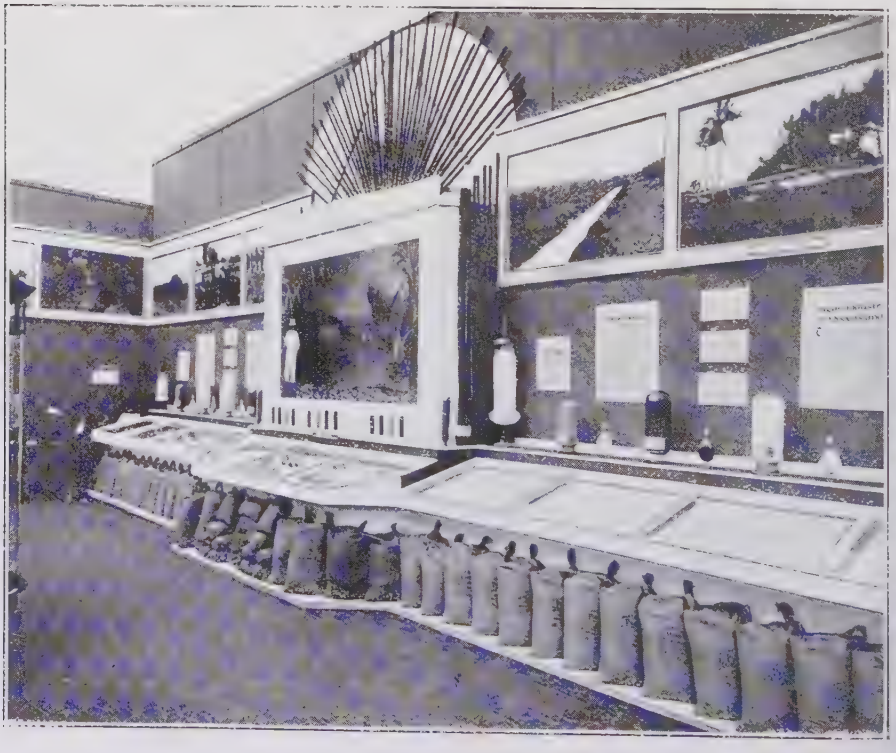


PLATE 118.—THE QUEENSLAND SUGAR INDUSTRY ILLUSTRATED AT WEMBLEY.

PLATE 119.—AUSTRALIAN WOOL AT WEMBLEY.

PLATE 120.—PITTSWORTH (QUEENSLAND) CHEESE AT WEMBLEY.

THE GLOUCESTER OLD SPOT PIG.

A BREED NEW TO QUEENSLAND.

E. J. SHELTON, B.D.A., Instructor in Pig Raising.

That the interest being created in the breeding of a better type of pig is being well sustained is evidenced by the fact that quite recently several new or comparative new (to Queensland) breeds of pigs have been introduced into Australia from countries overseas—the British Large Black, whose introduction was referred to in the October issue of the Journal and whose home is in the counties of Devon and Cornwall (England), and the Duroc-Jersey coming from Canada and the United States of America. This American red pig came to Queensland as a result of a careful investigation into the merits of the breed whilst Mr. Fred. G. Brown, of Mooroombin Farms, Toogoolawah, was visiting Canada three years ago. Now we have a further introduction in the Gloucester Old Spot, a breed whose original home is in the lowlands of old Gloucestershire and Somerset of England. This latter breed is one of the old English types, interest in which had, it would seem to appear, almost been allowed to lapse until about ten or twelve years ago, when fanciers of the type got together and formed what has since been called the Gloucester Old Spot Pig Society. At this time also a scale of points and their relative values was adopted.

The first consignment of Gloucester Old Spot pigs to land in Australia arrived in Melbourne per s.s. "Boorara" some time ago. The shipment consisted of thirty-two sows and eight boars selected from the best studs in England. They have been sent out by the society controlling the interests of this breed in charge of Mr. A. E. Ball, a Somerset farmer, who with his wife and family of seven sons had decided on settling in Victoria.

In a recent communication received from Mr. Ball and dealing with the merits of this breed he has the following to say:—

"First of all I would say the Gloucester Old Spot pig was, until recent years, kept entirely in the West of England, over a large area on which practically no other breeds were kept as far back as we have any knowledge or records of pig breeding. So pure have they been kept that I have never heard of a pure black or a pure white pig being born. Some have less spots, some have more, but they always have been and are now a spotted black and white breed. (See Plate.) It was not until 1913 that three west country farmers met at the London Dairy Show and first talked over the question of founding a breed society for the preservation and protection of this old spotted breed of pigs. The outcome of this convention was that a society was initiated to control the destinies of the breed. Shortly after came the Great War, which severely handicapped the young committee thus formed. Nevertheless, so well and favourably known had the breed become, that where £8 to £10 was a good price for a spotted pig before the year 1913, as much as 600 guineas had been paid for a boar at the Royal Agricultural Show of London in 1919, and 1,050 guineas was paid for half of a litter bred by the late Mr. H. Bridgman, and a sale average had been obtained of £103 for forty-eight head.

"The secretary of the society, writing the first year, stated that after the founders had paid for the incorporation and other fees and purchase of books exactly two pence was left to purchase a receipt-book. Seven years after the assets of the society reached the value of £4,000, while during the month of December, 1919, between £1,300 and £1,400 was received for entry and membership fees—an incredible income for a whole year for any pig breed society a year or two before; whilst the herd book of 1920 was the largest published by any pig breed society of Europe. The herd book numbers of 1921 carried the boar numbers from 2,507 to 3,914 and the sows from 7,030 to 12,412. To-day the Gloucester Old Spot pig is a popular pig in every county in England and bred more or less in nearly every country of the world. At the time of writing (September, 1924) they have been in Australia one year, and I receive letters every week from all over the country from satisfied breeders who prophesy an especially successful future for the breed here.

"Before attempting to give any description of the pig, I should like to say that the shipment of unrelated boars and sows, which it was my privilege to bring out from England, were specially picked by the Gloucester Old Spot Society to introduce the breed here. All of them are from noted prize-winning strains. This is a novel and, all will agree, a splendid and economical way of procuring imported stock. The Gloucester Old Spot is noted for its great length of side, with big hams and loins, a thick belly and yet not a heavy fat back. They are very popular with the butcher, as they provide a young tender carcass, full of lean meat, with the bulk of its weight in the hindquarter, from which the highest priced meat is obtained. They also weigh exceptionally well. I have frequently heard critics complain that they never get fat. It is true that a pig that grows very fast does not put on the fat on the back like an older matured pig will, and as these

PLATE 121.
Note the colour, shape, and general type of this new breed.

PLATE 122.—GLOUCESTER SPOT TYPES.
These two pigs were recently purchased from Victoria by Mr. C. W. Roseblade, of Yungaburra, North Queensland.

pigs are 120 lb. to 140 lb. when half grown, they do not carry a lot of wasteful fat. But the feeder is quite satisfied to obtain the same price for his six-month-old pig as many others do at nine and ten months, besides getting a ready sale where the matured fat pig is often hard to dispose of.

"At the Smithfield carcass competitions the Gloucester Old Spots have won the last three years for providing the greatest weight for age against all breeds. The pigs of 1922 weighed 360 lb. each at eight months, dressed weight. These pigs also lost less weight in killing than any other breed. With good feeding, porkers are ready at fourteen weeks and baconers at five to six months old.

"The sows are splendid breeders and one of the finest mothers in the world. One of the points much valued by breeders of this type here is that the pigs are quiet and docile in their habits, children can with perfect safety handle the ears of any of my boars or go into the pen with a sow that has just farrowed and handle the young pigs. These pigs are also noted for their fine grazing habits, and should be very useful in this respect with lucerne-growers."

In so far as colour is concerned the breed is perfectly distinct from other breeds and should have clear markings of equal black or white, but on the light side for preference. Wrinkles in the skin or a pronounced line of mane bristles or a decidedly sandy colour are disqualifications and should not be tolerated.

Purchases of Gloucester Old Spot pigs have recently been made for Queensland by Mr. C. W. Roseblade, of Yungaburra, *viâ* Cairns, on the Atherton Tableland, North Queensland (see Plate), and by the Brisbane Three-ply Timber Company, whose purchases were made through Mr. W. J. Warburton, of Northgate, whilst this breeder was in attendance at the Melbourne Show. These latter pigs, it is understood, are to form the foundation of a stud at the Kingston Butter Factory piggery.

The scale of points adopted by the Gloucester Old Spot Pig Society is as under:—

Gloucestershire Old Spot Pig Society, England.

Scale of points and their relative values in Gloucestershire Old Spot pigs as adopted by the Council.

Head—Wide between ears, medium length	4
Nose—Medium length, wide, slightly dished	4
Ears—Broad at base, drooping forward over nose, not to the sides, not thick nor coarse. Same length as nose	4
Neck—Medium length and muscular. Jowl must not be pronounced	4
Chest—Wide and deep	4
Shoulders—In line with ribs and not projecting, must not show coarseness	4
Back—Long and level, must not drop behind shoulders	10
Ribs—Deep, well sprung	6
Loin—Very broad	6
Sides—Very deep, presenting straight bottom line. Belly and flank full and thick. Well filled line from ribs to hams	8
Quarters—Long, wide, and not drooping. Tail set high and strong	8
Hams—Large, well filled to hocks	10
Legs—Short and straight	4
Skin—Should be black under black hairs and white under white hairs. Must not show coarseness or wrinkles	8
Coat—Fairly thick, long, and silky, not curly. Must not show coarse mane bristles. Black spots on white coat. Black should not predominate	6
Type and general appearance	10
Total	100

Objections.

Head—Narrow face and nose.

Ears—Short, thick, and elevated.

Coat—A rose on the back disqualifies. A pronounced line of mane bristles very objectionable. Decidedly sandy colour may disqualify.

Skin—Serious wrinkles may disqualify.

Legs—Crooked, especially in young pigs.

Neck—Heavy jowl objectionable.

Teats—Bad teats or less than ten.

Note.—This scale of points has now also been adopted by the Australian Stud Pig Breeders' Society (incorporating the Berkshire and Yorkshire Society of Australia).

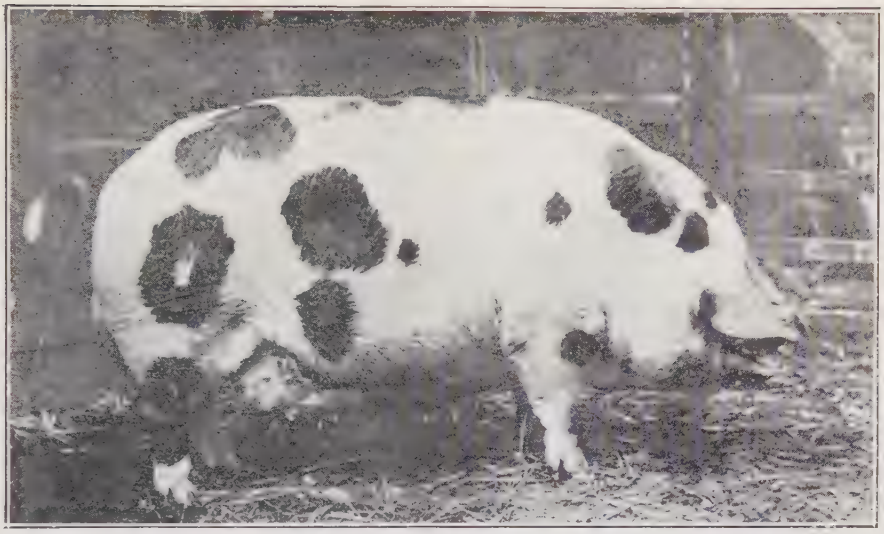


Photo. by C. Hosegood.]

PLATE 123.—G.O.S. SOW, "NASHES DUCHESS 3RD."
1st Buntingford Show, 1922; 1st Hertfordshire Show, 1922; 2nd Tring Show, 1922

PLATE 124.—"WINTERBOURNE GIFT" AND LITTER.

Winterbourne Gift's two sisters were sold for 200 guineas each, whilst six of her half-sisters realised 1,055 guineas. The property of A. E. Ball, Blagdon, Somerset.

PLATE 125.—A CHAMPION PRIZE-WINNING POLAND-CHINA SOW "DANESBORO JUDY,"
Note the great quality and evenness of type of this animal.

EARLY HISTORY OF THE PIG.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

Historical records in which many references are made to cattle, sheep, swine, and other stock, informs us that from the very earliest times the pig has been subject to domestication and his flesh used as food.

Amongst certain of the ancient nations the flesh of the pig was held in the highest estimation, whilst by others it was abhorred. There are many references to swine (as pigs are frequently called) in Holy Writ, and in the writings of the early historians, Pliny, Columella, and the Roman historians. Many wrote before the Christian era of pigs abnormally fat: one mentions the case of a sow being so fat that a field mouse made its nest in the fat along the back and produced young therein. The Egyptians not only abstained from eating the flesh of the pig but regarded the mere touch of the animal as pollution, whilst those using the flesh as food were considered degraded outcasts. Similar feeling was entertained by the Hindoos, who even to this day abhor the sight or smell of the pig.

In the marvellous commonwealth of which Moses was the head, a like abhorrence was noted and the Children of Israel were advised both by precept and example to abhor the pig's flesh. The Levitical code on this subject is precise and in the precepts, warnings and threatenings of the Prophets, the use of pig's flesh is denounced as a breach of the law and an abomination in the sight of God. Mahommed, one of the great leaders of men in the East, would not allow the pig to be mentioned or used in any way.

At the present day in the New Hebrides and in many of the South Sea Islands the pig is regarded both as a sacred animal and a sign of wealth. The native who can give a feast and kill more pigs than any of his fellows becomes a "chief." The natives generally find tremendous satisfaction in killing a large number of pigs as they firmly believe they will find in another world all the pigs they owned in this.

The pig's tusks are held as sacred; they are worn as charms and are carefully preserved under little huts in their "Sing Sing" grounds. Money would not buy these tusks, and if anyone, apart from the owner, dared to touch or disturb these greatly-prized treasures, it would mean instant death.

So important is a pig feast that the women (who, unfortunately, do not hold the same place in social and business life in those lands as in Christian lands) are not even allowed to have a hand in the preparation or cooking of it. In many of the Pacific islands the pig plays an important part, a man's wealth being reckoned by the number of pigs he possesses (the pigs are, of course, of less commercial value than here). In some of the Islands pigs are allowed to accompany the natives to their church ceremonies and to lie stretched at their sides whilst service is proceeding.

Dr. Fleming Jones, Chief Government Medical Officer in Papua, stated in a report recently, that pigs were treated with great consideration by the Papuans and are only killed for great feasts. It was quite common, he said, to see in the native villages women suckling a little pig at one breast, and a baby at the other.

The Chinese, one of the most ancient of the nations, are lovers of the pig, and the flesh is used freely, especially at their feasts. The Chinese are regular buyers at the Abattoir Saleyards in Sydney, and always buy up large numbers of pigs. In some instances Chinese buyers operate for well-known European firms. However, in comparison, possibly the greater number of the early races regarded the pig with disfavour and abhorrence: Why?

Possibly it may have arisen through the belief at one time prevailing that the pig's flesh transmitted "leprosy," for pigs were known in those days to suffer from a disease (no doubt due to lice, sun scald, &c.) resembling the human leprosy; or it may have been through the pig's voracious appetite and omnivorous (flesh-eating) habit, whereby possibly he carried into his body diseased as well as healthy flesh. Tuberculosis and other diseases would thus be distributed, for pigs, like other animals, are subject to this dread disease.

Of course, with our rigid system of food and meat inspection, we find it comparatively easy nowadays to reject diseased carcasses, and we understand the nature of these diseases, their cause and effect. We likewise know the flesh of the pig to be nutritive and wholesome, and in many lands—in Ireland, for instance—the pig receives equal, if not better attention than most of the folk who look after them. One prominent Irish enthusiast displays a notice over his pig sties instructing the pig man to "*Feed the pig first; yourself afterwards.*" Thus it is that the pig has been referred to as "The Gentleman that pays the rent," "The hog that

made Chicago,'' ''The Husbandman's best Scavenger,'' ''The housewife's most Wholesome Sink,'' &c.

The pig, as we now have him, is a descendant of the wild hogs ''Sus scrofa'' and ''Sus aper'' which are indigenous to Europe, Asia, and Northern Africa; a comparatively refined white type coming originally from China, ''Sus indicus,'' a different species, was used largely for crossing with the above and also with an earlier, black, offshoot of a species brought from Italy under the name of the ''Neapolitan'' in the production of our Berkshires and Yorkshires. The ''Peccary'' of America, a small rat-like pig, would appear to be the result of a degenerate type of the wild hog.

Colour and Other Characteristics.

In colour the wild hog was mostly a dusky brown with black spots or streaks. The skin was very thick, the hair bristly, and intermixed with a soft woolly undergrowth. He was lean, gaunt, gristly, much given to roving, very fleet of foot, strong and ferocious, but though so wild in his native state it is surprising how easily domesticated his offspring are, also how quickly they revert to the old type again if placed in a suitable environment. Thus sows farrowing out in the bush, the young ones become ''wild'' very quickly. Large numbers of these wild pigs may be found in the more remote districts of Queensland, New South Wales, and in New Zealand. In every instance they have reverted from the domestic type imported in the earlier days of colonial settlement. ''Captain Cookers'' these pigs are frequently called, this having reference to the offspring, run wild, of the pigs imported from England by Captain Cook and his successors.

The colour of any wild animal varies with the class of soil and the climate and environment he lives in; it may vary from a very dark or black to a very light grey or brown. The old wild pig was hunted a good deal both in Great Britain and on the Continent, as also in the western districts of our own country and New Zealand. ''Pig-sticking'' is there a common sport. At Queen's College, Oxford, the old Boar's Head Feast is still regularly an annual function.

However, with it all there is no food-producing animal which has contributed more largely to the food supply of mankind. The flesh is substantial and delicious, and is a favourite dish either in the fresh, salted, or dried or smoked (mild cured) forms. The edible portions of a pig's carcass affords a greater variety of dishes than any other animal.

The Modern Improvement.

Regarding the immediate history of the pigs we breed now, the old English wild boar, which is represented in the Tamworth and Large Black types, was domesticated and fed up to a fairly high standard, but it was a very difficult matter to improve them until the white type from China was introduced. These were a short, thick, fat type, of reasonably good quality, and when crossed on to the long, gaunt, gristly type of old England produced quite a different animal and one that responded very readily to good treatment. The Neapolitan type already referred to was also used at a later stage to introduce other useful qualities and the propensity to fatten more readily. These Italian pigs were long and somewhat boiler-like in form, low in the belly, and with a tendency to hollowness in the back; they were compact and thick in the limbs and carried a coat of soft silk-like hair, black or rich copper in colour. They were not so prolific as the Chinese or English type, but the progeny of these crosses readily became acclimatised and quickly gained popularity, and as opportunity offered (for transport was slow and difficult in those days) were distributed, and used in India, Japan, Borneo, Java, South Africa, New Guinea, and eventually, with the discovery of Australia and New Zealand, they came South. Careful breeding, feeding, and selection have been the main factors in their production, though very often in-and-in breeding has been resorted to.

Other Zoological Characteristics.

The pig is distinctly an omnivorous animal, that is, his digestive system is adapted to vegetables as well as fleshy foods. He has a single stomach, somewhat sac-like in shape, and has a rather long intestinal tract. In his natural state the food consists of all sorts of roots, nuts, worms and other flesh, grass, and succulent vegetation, &c. We utilise the waste food from the kitchen and garden, potatoes, turnips, and all sorts of root and similar crops, greenstuff, clover, peas cereals, acorns, bananas, and waste fruit generally, as well as milk and dairy by-products in his production.

Good grazing land with plenty of succulent herbage makes excellent pasture on which the pig loves to roam. The animal fattens rapidly on suitable food, more

readily than any other domestic animal. His senses are but slightly developed, except the sense of touch in the snout (which is very keen), sight, hearing, and smell are more acute in the wild than in the domestic pig. Though the eye is small, the pig can see long distances. The skin is comparatively thick, the growth of hair, varying with different breeds and with environment; thus in the warmer regions the skin is soft and almost free of the thick crop of hair which grows more readily in the colder climates where the skin is thicker and less sensitive.

A PECULIAR DISEASE AFFECTING THE EAR OF PIGS.

Some interesting research work has recently been carried out in New South Wales by H. R. Seddon, D.V.Sc., and H. R. Carne, B.V.Sc., of the Veterinary Research Station, Glenfield, which had as its objective the determination of the cause and effect of a peculiar disease, technically known as "Suppurative otitis" affecting the ear of the pig, the principal symptoms of which are the "abnormal method of carriage of the head and the interference with equilibrium and sense of direction. The disease, which, unfortunately, is all too common amongst pigs in Queensland, is featured in the "Agricultural Gazette of New South Wales," June, 1924. The reference the authors make to this disease is as follows:—

A condition has been noticed fairly commonly amongst young pigs in which the most prominent symptom is a peculiar alteration in the carriage of the head, which is accompanied frequently by unsteadiness of gait. The disease is seen usually in young pigs from a few weeks up to three or four months old. The reason for the relative infrequency of occurrence in older pigs is possibly that young pigs are more prone to catarrh (which appears to be the forerunner of the condition) and that affected animals suffer such loss of condition that they die or are killed as "runts" or "bad doers."

Symptoms.

The most characteristic symptoms are the abnormal method of carriage of the head and the interference with equilibium and sense of direction. The head is twisted or rotated to one side or the other so that one ear (the affected one) is depressed, such depression becoming more marked as the condition advances. It is noticed that the animal when walking about tends to circle in one direction, this being towards the side to which the head is depressed. For example, if the left ear is affected, the head will be rotated to the left with depression of the left ear and "circling" will occur in the same direction. At times this tendency to circle is not apparent, but it is noticed that when moving the animal does so with an awkward gait, whilst the head is moved from side to side in an unbalanced manner. Affected animals may also exhibit considerable difficulty in going straight up to the feeding trough, having to make several attempts before gauging the right direction, sometimes walking to one side of the trough and sometimes to the other. It has frequently been noticed that the condition is accompanied by discharge from the nostrils and eyes.

In advanced cases there are very apparent disorders of equilibium, the gait becoming unsteady and somewhat inco-ordinated, and the animals may fall into the feed trough and be unable to get out again.

Affected pigs are usually found to be "poor doers," showing a scurfy condition of the skin, lack of lustre of the hair, and poor condition. The appetite is capricious. In some cases examination of the affected ear reveals a considerable amount of yellowish brown or brown sticky discharge adhering to the inner surface of the ear.

Cause and Lesions.

Examination of several pigs showing such symptoms has revealed the presence of a suppurative condition affecting the middle ear, and this may be the only demonstrable pathological change found on post-mortem examination.

The hearing apparatus, it may be mentioned consists essentially of three parts:—

1. The external ear, which is that portion visible externally. Its function is to collect sound waves and transmit them by means of a passage to—

2. The middle ear.—This is separated from the external ear by the tympanic membrane or "ear-drum." The function of the middle ear is to magnify the sound waves collected by the external ear and transmit them to—

3. The internal ear.—This consists of an intricate structure by which the sound impressions are transmitted to the sensory areas of the brain. The internal ear,

however, performs another very important function—namely, the maintenance of equilibium, it being by means of part of this structure that an animal keeps its balance. Disease of these deeper structures of the ear, therefore, frequently leads to an unsteady gait, twisting of the head to one side, or even to inability to stand at all.

Both the middle and internal ear are situated within the petrous-temporal bone of the skull and it is within this bone that the lesions responsible for the condition are found. The petrous-temporal bones are placed immediately behind the articulations of the lower jaws and the skull, but a careful dissection by sawing open the skull along the longitudinal mid-line and removal of the brain is necessary to expose them properly.

In several cases so examined it has been found that a thick cheesy material is present in the cavities of the bulbous portion (bulla ossea) of the middle ear on that side to which the head has been depressed during life. Nominally these cavities in the bone have a honeycombed appearance consisting as they do of small empty spaces separated by thin plates of bone.

The accumulated pus in the middle ear tends to burst through the ear drum and discharge externally, giving rise to the sticky discharge which may, in advanced cases, be seen on examination of the passage in the external ear.

Examination of the pus shows the presence of bacteria, such as are commonly met with in other suppurative conditions in the pig. It is probable that in these cases they gain entrance to the deeper structures of the ear by way of a narrower passage (called the Eustachian tube) which leads from the back of the throat to the middle ear, and from the comparative frequence of nasal catarrh in young pigs, it is probable that this ear disease is an extension of this inflammatory process affecting the lining membrane of the nasal passages.

Prevention and Treatment.

Once the condition is established it is unlikely that any treatment will be of use. Syringing of the outer ear will remove the obvious discharge, but will not penetrate into the deeper structures from which the pus arises. While the discharge cannot be definitely prevented, all possible means, such as proper attention to cleanliness and housing, should be undertaken in order that chills may be avoided. Diet should also be attended to, as it is found that this also plays a not unimportant part in the causation of those diseases, such as catarrh (snuffles) and pneumonia, with which the condition is frequently associated.

Plate 126.—Stanthorpe District Fruit Exhibit, Brisbane Show, 1924.

ABSTRACTS AND REVIEWS.

All foreign agricultural intelligence in this section, unless otherwise stated, has been taken from "The International Review of the Science and Practice of Agriculture," published at Rome by the International Institute of Agriculture.

The Scrub Bull—Efforts to Eliminate Under-bred Sires.

M.C., "The Farmer and Stockbreeder" (U.K.) No. 1820, Vol. XXXVII., N.S., August, 1924.

Is the scrub bull to go the way the mongrel stallion went? The latter was banished from the roads years ago, and the gain to horse-breeding and to horse-breeders has been of no small account.

The problem of the inferior sire in relation to cattle is wider and more complex than in reference to horses. Whereas stallions are seldom kept for exclusive use on the owner's farms, but are travelled for hire in districts near to or distant from the home of the owner, the converse applies to bulls; they are retained almost entirely for service in the home herd, or if they are used by others than the owner, such service is on a limited scale. In considering the general question of inferior sires, therefore, it is necessary to take into account the circumstances that apply to each class of stock and to examine the subject from the particular angle applicable.

Compulsory Use of Pedigree Bulls.—In Scotland there is a strong and growing feeling that the non-pedigree bull should be debarred from propagating his kind. The idea has wide support in England and Wales also. Indeed, some years ago a definite proposal was made that compulsory powers should be sought to prohibit the use of under-bred sires—the kind of bull that is unfit by breeding and individual merit to beget calves suitable for rearing. Bulls of the type indicated are plentiful, and known in most districts. The best breeders do not want them, and the country is the poorer because of their presence. It is the common supposition that dairy farmers are the worst offenders in the matter of inferior bulls, but they are not the only defaulters. In all parts of the country there are abundant evidences of negligence regarding the class of bull kept. Even when the progeny are to be retained for replenishing the herd the influence of the sire is not always sufficiently recognised, and the quality of the stock suffers in consequence.

The chief culprits are the breeders who do not intend to rear the calves; the owners who look upon calves as cumbersome by-products in the business of milk production. In these cases the calves are sold at or shortly after birth for what they will bring. Often they are slaughtered while still wastefully immature, but a certain proportion find their way into the possession of farmers who make a point of rearing young stock, either to be fattened off at six months or less, or run on as stores to be sold to the graziers at two or more years old. Whatever the fate or the future of the calf, serious waste results when its sire is of a defective class. The dam is not unimportant by a long way, but presumably she is of passable merit, or she would not be retained and bred from. In any case, the question under discussion in many parts of the country is that of the bull, and it is well that there should be concentration upon one aspect of the broad subject at a time.

Value of Well-bred Animals.—The vital influence of heredity even in ordinary commercial animals is quickly discernible. At the recent Conference at Edinburgh, it was suggested that whatever improvement was noticeable in cattle in the past generation may have been attributable as much to better methods of feeding as to the more careful selection of the parent stock. Experienced farmers who keep an accurate record of the cost of feeding will not endorse this view. Much has been learned regarding the use of feeding stuffs in the past thirty years, but whatever benefit has accrued to farmers has come to them in the form of quicker returns or reduced expenditure; it has not altered in the smallest degree the relationship of the merits of well and ill-bred animals. The bullock bred from good stock, such as would be approved under any acceptable scheme of bull selection, still fattens as rapidly, cheaply, and easily as compared with the descendant of the mongrel bull as he ever did. And, in addition, when he is fat he sells more readily and brings a higher price per lb. If there is to be appreciable improvement in the common cattle of the country, a start must be made with the breeding of the animals, and as the number of bulls is smaller than that of cows, and the influence of the sire larger in inverse proportion, it is clear that the bull is the proper point for attack.

Difficulties in the Way.—While the existence of defects can be readily detected, however, it is not so easy to suggest or devise effective remedial measures. At a meeting of Scottish breeders various proposals were discussed, but it was decided to refer fuller consideration of the general question to a committee. Opposition was raised to the proposal to restrict selection to registered sires. In the case of the

Shorthorn, for instance, it was explained, this course would exclude a large proportion of the excellent Cumberland cattle, than which for certain uses there are no better in the country. The non-registered Shorthorns of the Lake Counties are for the most part as carefully bred as the herds in the breed register, but they are without herd book numbers. To exclude them from acceptance under a Government or voluntary scheme would be a great mistake, and could not be justified on any reasonable ground. In respect to the purely territorial breeds, compulsory measures might be applicable; but the position is more difficult in regard to the more widely distributed varieties. It is probable, however, that compulsion will be resented and resisted, even if the importance of the issues involved should justify drastic action. How the idea is to be made effective is a problem that will exercise the most ingenious minds for some time. The importance of the question will justify a bold attempt to solve it, however, and the Scottish farmers have tackled the task with a determination that encourages hope of ultimate success.

Goodwill of Farmers.—Even when the best organisation conceivable has been devised, the full results will be obtained only with the co-operation of the farmers concerned. The individual breeder will have to work out a plan on a different basis from that usual in the past. It will not be possible, it is to be feared, to help the owner who declines to help himself, or to take an active part in the process of grading up his cattle. With the goodwill and appreciative collaboration of the farmer, he would soon be able to perceive the advantage of using well-bred bulls, and the economy of paying the slightly higher price for a bull that would beget good calves. When this part of his education has been completed, the rest will be simple. One of the first things to aim at, therefore, is to induce recognition of the principle that there is need for improvement, and then to prove that by a comparatively simple and speedy process, involving no great expenditure of capital, the desired improvement can be effected.

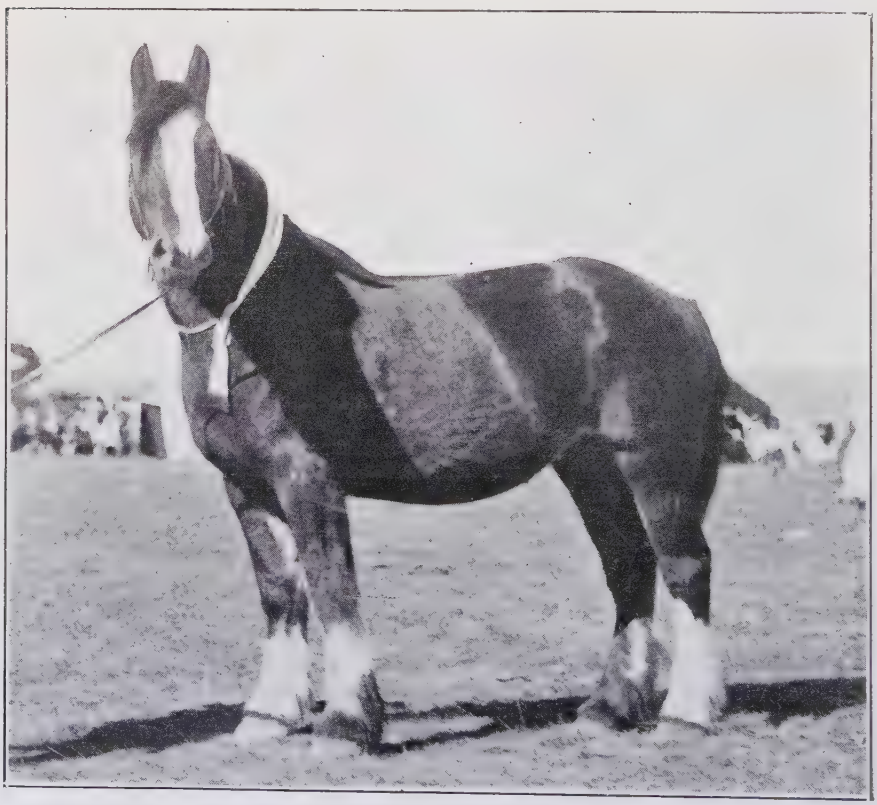


PLATE 127.—CLYDESDALE MARE, "JEWEL."

(Sire, Hero—Here I Go; Dam, Bonnie—Rob Roy).

Winner of Three First Prizes and Champion, Murgon Show, 1923. Bred by, and the property of, E. A. Hancock, Murgon.

THE MAIN ROADS BOARD.

THIRD ANNUAL REPORT.

In Queensland in recent years there has been a marked development of roadway construction from a casual activity in the hands of untrained men without programme or plan, other than to maintain a minimum of convenience and facility for ordinary traffic, towards a reasoned industry in the hands of competent engineers, supplemented by intelligent local help. This is part of the forward Government policy of making country life more attractive, and its aim is to provide in rural districts complete and economical traffic service. The Main Roads Board is a medium through which much substantial progress is expected, and the subjoined extracts from its Third Annual Report, together with the plates illustrating its activities, convey a good impression of the scope and importance of its work.—Ed.

Importance of Correct Design of Road.

The preliminary work of road design is a most important one, for it is necessary to consider proposed works from the point of view of the long loan period specified in the Acts, hence the road constructed must be of such a character that it can be maintained in good trafficable condition for a long period at a minimum cost; whilst on the other hand it would be wasteful to pave it to too great a thickness, or under certain conditions of traffic and soil to pave it at all. The classification by the engineer of the bearing quality of the foundation and class of traffic which may be expected is, therefore, of great economic importance. As an example, there are many varieties of black soil, some requiring under heavy loading condition a consolidated thickness of up to 15 inches of paving material, whilst others may contain a proportion of sand (black sandy loam) when 9 inches or less of paving material might be sufficient. A mistake in classification would thus easily increase the cost of paving by 66 per cent.

In order to avoid either errors involving excessive thickness of paving material on the one hand or too small a thickness on the other, which would result in rapid disintegration of the road, the surveyors' classification of soil is checked with the Board's original notes when the road was first inspected, and where any doubt exists the district engineers make further check classification and remodel the design where necessary.

The thickness necessary for various soil classifications and traffic conditions are indicated in the appendix to the Board's first Annual Report. This classification is being extended, and actual samples of soil for comparison purposes are being collected and mechanically analysed, so that when any doubt exists as to the bearing capacity of the soil it may be compared with soils of known capacity.

The value of materials close at hand and of any use for paving must always be considered before deciding on the use of more durable material which may have to be transported long distances. This requires judgment as to the possible life of each class of material and, where no previous knowledge of the behaviour of the materials exists, it is the Board's practice to have rattler tests and microscopic examination conducted at the University.

In the case of bridge design, the problem of what material it should be constructed must necessarily be first decided, and the principles were enunciated in the first Annual Report, page 9. Yatala Bridge over the Albert River in Beenleigh Shire is a case in point. Designs in reinforced concrete and timber were prepared, and the following extracts from a letter from the Board to the Council will serve to illustrate the importance of the subject:—

MAIN SOUTH COAST ROAD—TENDERS: YATALA BRIDGE.

The lowest tender for concrete construction is £14,009 16s. 6d., and for timber £5,790 12s. 9d.

When maintenance and renewal funds are capitalised (on the basis of renewals in timber at twenty-year periods, and calculating that the first renewal will cost 50 per cent. more than present costs, and on the basis of a

PLATE 128.—REDCLIFFE ROAD. COMPLETED SECTION CONSTRUCTED WITH TRACHYTE METAL FROM BEERBURRUM.

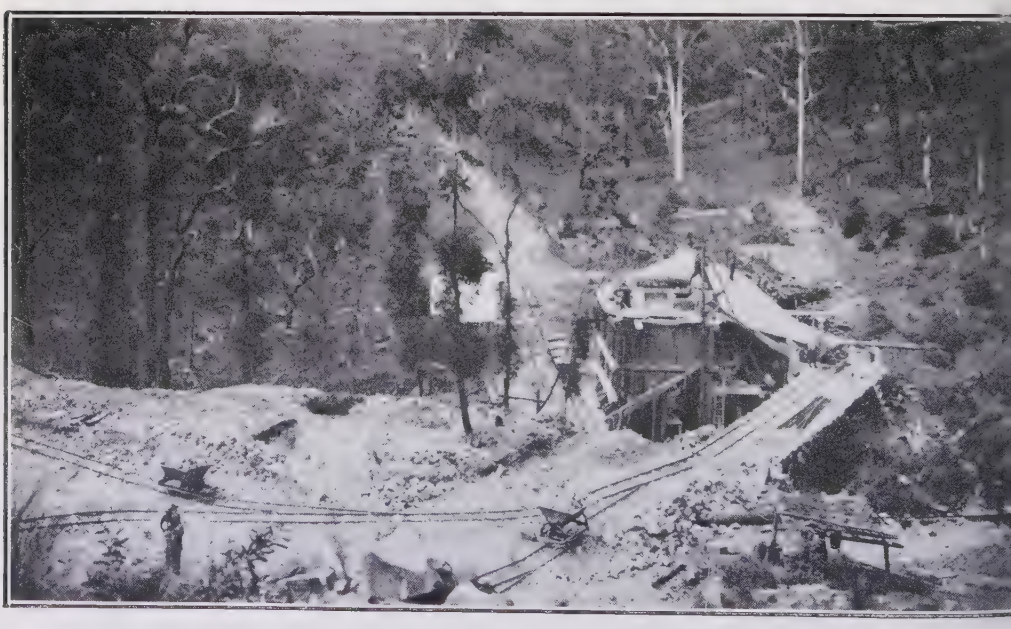


PLATE 129.—QUARRY PLANT AT BEERBURRUM, SHOWING LIGHT TRAMWAY CONNECTING WITH NORTH COAST RAILWAY. HAULAGE IS BY MOTOR CYCLE ENGINE ON A TRUCK FRAME.

Plate 130.—Butcher's Creek Bridge and Section of New Road on the Evelyn Tableland, North Queensland.

Plate 131.—Clifton-Pilton Road, Clifton Shire, over Black Soil on Darling Downs.

fifty-year life for concrete), the result is in favour of timber construction by an amount of £1,682, whilst if capitalisation on the basis of building a timber bridge at present and renewing in twenty (20) years with concrete is considered, the difference is still more marked in favour of timber construction at the present time—viz., £2,145.

Furthermore, at the end of the life of a timber structure erected now, concrete construction will, in all probability, have improved so much that a better bridge at cheaper cost would result, and also would give the opportunity of erecting a wider and even stronger bridge if traffic so demanded.

This method of dealing with this structure will also leave available £8,219 for present or near future needs of other portions of the South Coast Road.

Approval is therefore now granted to the acceptance of the tender of £5,790 12s. 9d. for a timber bridge.

In numbers of other cases the concrete structures have been decided on in the light of similar analyses, as each case must be dealt with on its merits.

Increasing Demand for Good, Well-graded Roads and Bridges.

The need for better roads becomes more pressing each year with the advent of motor transport and the increase in the area of dairying operations, wheat, lucerne, and cotton-growing, &c.

Areas, which but a few years ago were regarded as being too far from a railway or port for economic development, can with present-day transport facilities be profitably farmed if they are but served by decent roads; in fact, under modern transport conditions, the haulage cost per ton-mile falls more rapidly as the distance increases than under the old conditions.

Average costs in this State for motor haulage on good roads are approximately—

1-mile journey, 1s. 9d. per ton-mile;

11-mile journey, 10d. per ton-mile;

whilst in Southern States the cost for a 50-mile journey is as low as 6d. per ton-mile where the roads are good.

When this is compared with the rates of 1s. 6d. or more per ton on a 50-mile journey over rough, boggy, and ungraded roads, it will be readily realised how powerful a factor the good road will become in rendering it possible to farm lands at considerable distances from the railway—lands which otherwise would remain in their primeval state, or at best be used only for grazing.

Very great reduction in haulage costs are often effected by the construction of a comparatively short section of road which has been perhaps too steep or a quagmire for months in the year, or perhaps consisted of heavy sand. The construction of a deviation less than one mile in length in the Kilkivan Shire, designed to avoid a very steep hill, is such an example, and has undoubtedly increased the capital value of the land served by an amount equal to many times the cost of the work.

It is considered necessary to enunciate again certain principles in the Board's road-making policy, for it is apparently still presumed by certain Local Authorities that every foot of a gazetted road is intended to be macadamised. This is not so in the majority of cases. Miles and miles of those roads gazetted will need little in the way of permanent works, other than clearing and draining, for many years to come. In the Western country, as previously pointed out, only creek and river crossings, or fords and floodways, will be dealt with.

Even in the more closely settled areas of the Darling Downs, where the roads have to carry heavy wheat traffic, the only sections requiring urgent attention are those on the heavy black soil. The reddish black soils form fair natural surface roads.

On the other hand, relocation and grading of mountain sections in farming districts is essential.

The occasional misstatement that interest and redemption charges on works constructed by the Board are not equal to the saving on the cost of haulage or other advantages is discounted by the clamour of Local Authorities for more and more Main Road works. In any case, it takes no account of the great social advantages of the good road.

As sections of roads are made trafficable in all weather, the farmer or dairyman will not require to let his produce rot in the paddocks whilst waiting for the boggy roads to dry before carting can be resumed.

In the Springbrook area the farmers have produced evidence to the Board that one-third of the cream produced had been graded as second class, resulting in a loss of twopence per lb., or a gross loss of £645 per annum, due entirely to bad roads. Cream, which is half churned before it reaches the factory and which is exposed to the sun for hours longer than necessary, due to bad roads, is graded lower and is a direct loss to the individual and to the country.

Only three local authorities in the State have so far objected to the Board's proposals, and in only one case has it been considered advisable to recommend that work be undertaken against the wishes of the Council.

Some of the least developed areas in the State lie immediately behind the coastal range, and it is hoped to gradually develop these areas by roads leading to the nearest railways.

The schemes at present in hand tending towards such developments are:—Sarina-Nebo road, Collinsville towards Mount Coolan, and Cairns-Tableland road. Several others, such as roads in the Mary Valley, to the west of Maleny, and Montville should be undertaken as early as funds can be made available.

The practical value of proper location on easy gradient and of deviations which eliminate stream crossings has now been well demonstrated on completed sections of roads, such as Landsborough-Maleny, Tambourine Mountain, Rathdowney to Mount Lindsay, and Marburg-Frenchton, whilst the construction of a number of bridges, at present in hand or about to be commenced, will be of great value.

The chief of such are shown in the table hereunder:—

	Length.	Type.
Yatala Bridge, over the Albert River	3 40 ft. and 6 30 ft. = 300 ft.	Double girder timber
Bowen River Bridge, near Collinsville	12 30 ft. and 440 ft. causeway	Timber; low level with concrete causeway
Herbert River Bridge, near Ingham	450 ft.	Timber; low level; designed also for tramway
Beatrice River Bridge, near Millaa Millaa	2 25 ft. and 1 70 ft.	High level; composite truss and concrete piers
Burrum River Bridge, near Howard	310 ft.	Low level; reinforced concrete
O'Connor's Crossing, Lockyer River, near Gatton	5 25 ft.	Timber; low level
Boyne River Bridge, Mundubbera Shire	300 ft.	Timber; low level
Baffle Creek Bridge, Miriam Vale Shire	275 ft.	Timber; low level
Hulbert's Crossing Bridge, Wyangarie Shire	200 ft.	Reinforced concrete
Palen Creek Bridge, near Rathdowney, Beaudesert Shire	3 35 ft.	35 ft. double girder spans in timber

Transport and Excavation of Road-making Materials.

Whilst there is a wide range of good road-making material varying from mixtures of sand and clay, gravels, metamorphic and igneous rocks in the State, yet often they are not available close to the works, and transport to the road becomes an expensive and difficult matter.

In many instances the Board has been compelled to construct light tramways for hauling quarried metal to the crusher, or from the crusher to the railway. Some of these tramways are gravity operated, as at Lowood, and Jim Crow, near Rockhampton.

On others, where the grade undulates and is somewhat steep, horses are employed to haul the trucks.

At Beerburrum, the crushed metal is hauled three-quarters of a mile by petrol locomotives (constructed from ordinary side-tipping truck frames and motor cycle engines) to the railway, and is thence distributed by rail. This metal, where supplied for the Redcliffe road, has to be hauled distances up to 11 miles by motor truck or traction engine after it is unloaded from the railway.

At Sarina, the metal will be hauled by locomotive over the Plane Creek Sugar Mill Tramway to various points.

PLATE 132.—HAMPTON-ESK ROAD READY FOR METALLING, CLIMBING THE MAIN RANGE.

PLATE 133.—MACADAMISED ROAD RECENTLY CONSTRUCTED ON THE ATHERTON TABLELAND, NORTH QUEENSLAND.

PLATE 134.—BOARD'S BITUMEN HEATER AND SPRAYER.

PLATE 135.—BEAUDESERT SHIRE. A DEVIATION ON THE BRISBANE-MOUNT LINDESAY ROAD WHICH AVOIDS FOUR CREEK CROSSINGS.

Plate 136.—Kingaroy Shire. Macadam Road with Rubble Shoulders.

Plate 137.—Degilbo Shire Road under Construction awaiting Top Course Metal.

PLATE 138.—GOOBURRUM SHIRE. NEW ROAD NEAR BUNDABERG DURING CONSTRUCTION.

ATE 139.—LOWOOD QUARRY, SHOWING A PASSING LOOP ON THE GRAVITY CABLE TRAMWAY LEADING FROM QUARRY TO CRUSHER.

The employment of tipping motor trucks of an average capacity of three cubic yards is proving the cheapest method of transport where the leads exceed one mile, and they may be more economical than horses and drays on still shorter leads if special arrangements are made for quick loading.

Tractors have been employed successfully in lieu of horses for ploughing, scooping, and working graders in a number of instances on Board works.

The employment of manual labour in earth-moving cannot be too strongly condemned in most cases. The men are much better employed in handling scoops, ploughs, graders, &c., although, of course, certain operations, generally a minor part of the work, do require manual labour.

The heavy cost of moving rock-crushing plant to small jobs often outweighs the saving of the mechanical breaking, and it is frequently necessary for the Board to combat the desire of the Council to start small job work on several roads simultaneously.

Wherever extensive and extended quarrying operations have been commenced, the Board has provided air compressors and rock drills, and these have also been employed wherever extensive rock cuttings have been made, but it is obviously impossible and indeed uneconomical to provide such machinery in every job irrespective of the amount of quarrying and rock cutting. Many Councils have failed to look at the matter in this light, and have made unwarranted criticism even whilst failing themselves to provide the smallest item of plant.

During the year the Board has considerably strengthened its power rolling plant (10 to 14 ton rollers), which now consists of six steam and four Diesel rollers. Quicker and better consolidation of surfaces has resulted; animal drawn 5-ton rollers are also fully utilised.

WORKS IN VARIOUS DISTRICTS.

Darling Downs and Western Area.

It has been found on the Darling Downs that much of the surface stone or outcropping boulders of basalt provide a very good class of road metal for top course, and the most economical way to handle such stone is to create depôts near the road. It is often necessary to accumulate the whole quantity of stone required for a section before crushing is commenced, as otherwise the supply to the crusher could not be maintained after wet weather, owing to the impossible state of the tracks over which metal must be carted.

Operations in the vast Western Downs of the State are necessarily restricted to the construction of bridges, culverts, fords, or floodways, for the sparsely populated nature of the country and great mileage of the roads would not warrant attempting to macadamise or gravel them.

The class of work first mentioned is, however, very necessary, as without such improvements traffic would be held up for weeks at a time. Traffic is, of course, almost impossible in any case on black soil plains for a day or so after rain. Works of the above character are in progress in Winton, Longreach, Wyangarie, Mackinlay, Cloncurry, Adavale, Wambo, Taroom, and other Western Shires.

North Queensland (Tablelands).

On the Tablelands of North Queensland, the need for good roads is a matter of vital importance, for traffic is maintained only with difficulty on unmetalled or ungravelled roads over the rich volcanic soil during the wet season, which lasts generally from four to six months in the year.

A great deal of the Board's energies in the North have been concentrated on the problem of ameliorating those conditions by the construction of practicable gradients (not steeper than 1 in 20) and by macadamising sections of road.

The completion of the road leading from the coast, near Cairns, to the hinterlands, and rising 2,600 feet in 12 miles on a compensated gradient of 1 in 20, will be a red letter day in the history of road-making in North Queensland. This work is being carried out under the Commonwealth Main Roads Development Act. The location and working surveys on this route kept occupied three survey parties for nearly twelve months, and entailed considerable hardships on their part, owing to the roughness of the range and lack of communication, wet weather, &c. Over 5 miles of the range section have been completed, and some 7 miles of earthwork between Yungaburra and the top of the range extended to meet it. Grading and metalling works are in progress or completed in the vicinity of Atherton, Yungaburra, Millaa Millaa, Peeramon, and Ravenshoe.

Sugar-producing Areas.

In the sugar districts, economical transport of cane by narrow gauge tramways has been secured, but lack of roads is none the less keenly felt. In some areas farmers are unable to reach their homes excepting by "rail pump car," whilst in others the existing tracks are quagmires in the wet seasons.

Isolated cane areas adjoining the larger areas do not warrant the construction of tramway, and farmers are pressing for roads so that cane may be transported by motor truck.

The Board has in hand the construction of many miles of roads in the Cairns, Innisfail, Ingham, Ayr, Townsville, Mackay, and Sarina districts, and, invariably, the greatest problem in these areas is the provision of suitable paving material at reasonable cost. At Ingham a bridge 475 feet long and approach roads is being constructed over the Herbert River, which will make available sugar lands on the north side of the river. At Ayr a good type of sand-clay road is being constructed, no local metal being available. The work has been well organised by the local Shire Council, and practically no other plant except the Council's is being used on the job.

Central Districts.

Construction is well advanced in the Rockhampton district, and the roads will chiefly benefit the dairyman and cotton-grower.

Much of the country is brigalow and coastal scrub, which requires considerable grading to eliminate the large melon holes. Rubble metal (C class) is most generally employed for surfacing, but some miles have been paved with crushed stone in addition. The provision of waterways greatly increases the cost of construction in this area. Examples of good roads constructed twenty-five to thirty years ago, and before the formation of shire councils, exist in this district. Even to-day they are in good condition, and are a fine illustration of the value of permanent work, and are in contrast with the average work of shire councils as performed to-day. Parliamentary records indicate that even as far back as 1860 roads were being constructed in Queensland at a cost of £6,000 to £7,000 per mile.

In the Gayndah and Mundubbera district a number of miles of macadamised roads on the black soil country were completed, and work is being steadily pushed forward. The Gayndah conglomerates are being largely utilised on certain roads. The erection of a timber low-level bridge over the Boyne River will, it is hoped, be shortly commenced, and will prevent the frequent interruption of traffic from the dairy farms to Mundubbera Butter Factory.

The Mundubbera-Gayndah-Goomeri-Kingaroy-Kumbia road is one of the longest and most important main roads in the State, and works are in progress on various sections throughout its length, whilst very good progress is being made on the branch leading from Ban Ban Springs, through Coalstoun Lakes-Biggenden-Dallarnil to Childers. The work in this branch has been completed for 9 miles, and consists of clearing, regrading, gravelling, and the provision of small bridges and inverts.

In the Murgon and Wondai districts good progress was made, and here again conglomerates and gravels have been utilised for paving.

The formation of Murgon-Boat Mountain road, on a new location with a gradient of 1 in 20, will shortly be completed. Similar work on new locations has been completed on Murgon-Windera road.

All these roads are of great value to the grower of maize, cotton, and dairy produce, and provide easy means of intercommunication between various centres. Some miles of macadamised roads have also been completed in Gooburrum and Burrum Shires.

Southern Coastal Areas.

The roads operated on are those leading either from the railway towards the coast in the dairying, sugar-growing, and fruit areas, or leading up the Blackall Range from the coast, such as the Landsborough-Maleny road. A considerable section of this latter road, which involved heavy cuttings, stone wallings, and heavy macadamising, is in use.

Operations on the Redcliffe road were hurried on as fast as funds available would permit, and shut down early in the year, the traffic having been since carried over the bottom course for some miles. Work has now recommenced.

Some 3 miles of the Brisbane-Ipswich road have been recently thrown open to traffic, and two reinforced concrete bridges and a number of culverts have been completed.

A section of the above road at Goodna has been bitumen-surfaced with good results, and the 3-miles section is being similarly treated.

Southern Area.

The Rathdowney and Mount Lindsay road works have made considerable progress. Some miles have been macadamised with ferruginous sandstone, and although sections have been carrying heavy timber-wagon traffic for eighteen months there is hardly a mark on the surface.

This road, part of which is being constructed under the Federal grant, is destined to become a great interstate route, and the market road for a considerable distance around Urbenville and Woodenbong, in New South Wales, thereby bringing produce to the Beaudesert Tramway.

One deviation in this work eliminates five crossings of Palen Creek. Several small bridges and one larger bridge over Palen Creek have now been completed.

The mountain section of Tambourine Mountain road, one of the most difficult works so far undertaken, has now been completed. It rises to a height of 1,800 feet above sea-level.

Macadamising and regrading is in progress on Beech Mountain-Canungra road, and two sections of Beenleigh-Tambourine road have been completed and opened for traffic.

Sections of road in Normanby and Tarampa Shires on the Warwick road and Gatton-Mount Sylvia road were completed, whilst the Lowood-Forest Hill road in Esk Shire is being macadamised.

The new gradients between Marburg and Frenchton and Hampton and Esk were completed during the year, and are now being macadamised.

O'Connor's bridge, over the Lockyer, on the road between Gatton and Helidon, is nearing completion.

A number of sections on the heavy black soil of the Darling Downs, leading traffic to the railway stations, have been completed in Clifton, Cambooya, Glengallan, and Allora districts, and some miles of the Allora-Warwick road have now been completed.

Considerable lengths of regrading and granite sand surfacing have been completed on gazetted roads in Stanthorpe Shire.

MAINTENANCE.

With the construction of sections of new road it is necessary that they shall be maintained, and it becomes increasingly necessary to place other sections of old road in more serviceable conditions, and to eliminate pot holes on unconstructed sections. As soon as possible after the end of the financial year local authorities are advised of the amount of money which the Board has allocated for each road, and they are required to submit a schedule of proposed works. Local authorities are encouraged to provide for additional maintenance work out of their own funds if possible to supplement the Board's work.

Much greater attention to maintenance work of a proper standard has been given by the local authorities during the past year, and the methods of work set forth in the second annual report have in most instances been followed.

On a considerable mileage of road, the Board has carried out gravel resheeting work of this character with its own plant and gangs. The Main South Coast road and Redland Bay road has thus been considerably improved at a comparatively low cost.

Waterford Shire has carried out much excellent maintenance work on Beenleigh-Tambourine road.

Attention to drainage, repairs to culverts, and extensive bridge maintenance has been carried on throughout the gazetted roads. Several roads carrying traffic into metropolitan and provincial city areas have been surface treated with tar and bitumen.

PLATE 140.—JACKSON'S CREEK BRIDGE, SARINA-NEBO ROAD. TYPICAL TIMBER BRIDGE.

PLATE 141.—SECTION OF SARINA-NEBO ROAD, MACKAY DISTRICT

PLATE 142.—GAYNDAH—BINJOUR—MUNDUBBERA ROAD FIRST MACADAMISED SECTION OVER BLACK SOIL.

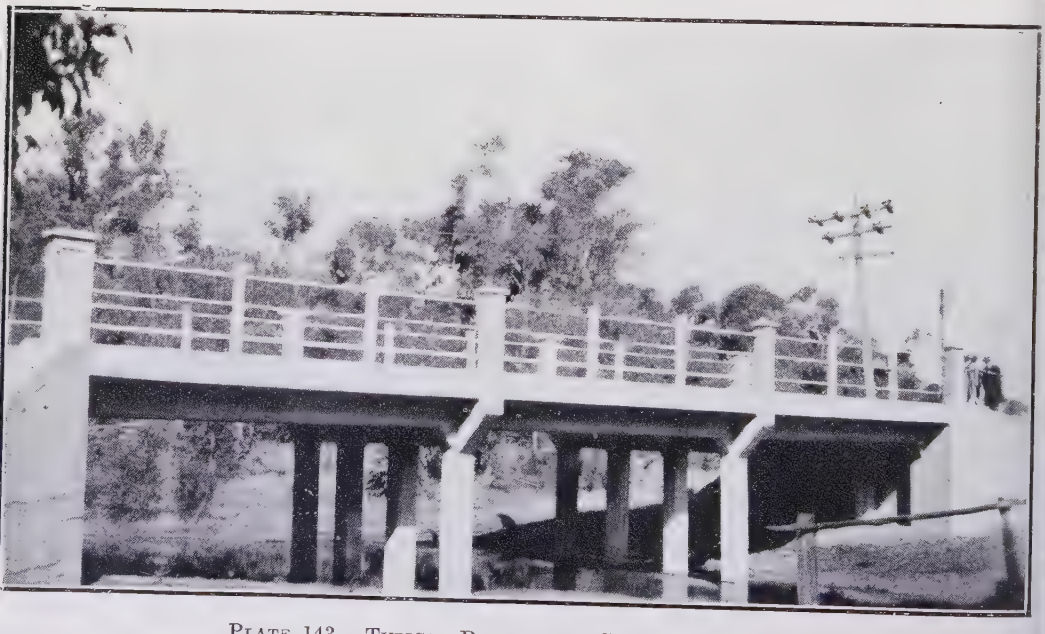


PLATE 143.—TYPICAL REINFORCED CONCRETE BRIDGE.

Plate 144.—New Road up Tambourine Mountain.

THE DAIRYMAN'S VETERINARY CHEST.

Every dairy of any standing possessing valuable stock should be kept supplied with the following drugs, kept in a locked cupboard, each separate kind being distinctly labelled to avoid mistakes:—

Purgatives and Laxatives—
- 10 lb. Epsom salts.
- 1 lb. ginger.
- 1 gallon raw linseed oil.
- 1 quart castor oil.

Applications to the Udders and Teats—
- 1½ pints olive oil.
- 1 lb. lard.
- 1 pint camphorated oil.
- 1 lb. vaseline.

Bloating—
- 1 pint turpentine.

Disinfectants—
- 1 lb. carbolic acid.
- 1 lb. boracic acid.
- 1 gallon zenoleum, creolin, or izal.

Tonics and Stimulants—
- ½ lb. sulphate of iron.
- ½ lb. gentian.
- 1 pint whisky or brandy.

In addition to the foregoing, the following appliances for treatment of disease and the administration of medicines can profitably be included:—Drenching bottle with long neck, trocar and cannula for bloating, graduated measuring glass; milk fever apparatus, clinical thermometer, injection pump, or 6 ft. ½-in. rubber hose with glass funnel, hard rubber syringe, three milking tubes and set of hand clippers.—"Country Life and S.S. Journal" (Sydney).

PLATE 145.

Fruit Packing Instruction in Northern Coastal State Schools by Departmental Officers has been followed by the formation of Fruit Packing Clubs by enthusiastic scholars in every Orchard Centre. Competitive exhibits were staged at the last Bribie Show and attracted much attention and stimulated greater interest in this phase of effective fruit marketing.

General Notes.

Northern Fauna Sanctuaries.

The recreation reserves at Lakes Eacham and Barrine, in the parish of East Barron, have been declared sanctuaries in which it shall be unlawful to take or kill any animal or bird.

The Californian Citrus Case.

As one result of the Conference of Ministers of Agriculture held in Sydney recently, the Californian citrus case has been included in the list of fruit cases to be used in Queensland. This case is 23 inches long by 11½ inches wide by 11½ inches deep, and has a central division, measurements to be clear of all or any division. The case should have a capacity of not less than 3,041·75 cubic inches.

Staff Changes and Appointments.

Constables V. J. Quinn and W. J. Barrett, stationed at Evergreen and Arrilalah respectively, have been appointed Inspectors of Slaughter-houses.

Mr. P. Rumball, Supervisor and Poultry Instructor, Soldiers' Settlements, Mount Gravatt and Enoggera, also Supervisor, Soldiers' Settlement, Highlands, has been admitted to the Professional Division of the Public Service and appointed Poultry Expert, Department of Agriculture and Stock.

Pests Declared.

The Mock Olive, Cape Gooseberry, and Devil's Apple, also the Apple of Sodom, have been declared to be pests within the meaning of the Diseases in Plants Acts within the Stanthorpe Fruit District, described as under:—

> "All that part of the State enclosed by the southern border and lines commencing at Cullendore Crossing on the border, passing through Silverwood, Mountside, and Granite Hill, and then due west through Gore to 151 degrees 30 minutes meridian; and thence south along the meridian to the border."

The Price of Grain Sacks.

The price of sacks for maize and wheat is pressing heavily on primary producers in Queensland, and particularly with maize, which is at a low price. In Sydney a recent advance was made of 3d. to 15s. 6d. a dozen, spot and forward. The "Sydney Morning Herald" says:—"The country and interstate demand was unabated in strength. When asked if there was a likelihood of such a position as the present high rates denoted occurring again, a merchant said that the remedy lay in the farmers' hands. If they liked to take the risk of buying sacks in July there was no possibility of them being squeezed for their supplies in October. At present the merchants took all the risk, and if they did not receive orders in July they bought only a limited number of sacks. Farmers could have bought last July at 11s. 6d. per dozen, he said, and if they were so inclined they could now buy their next season's supplies. Woolpacks were quiet at 5s. 6d. each, spot and forward, and bran bags were dull at 7s. 9d. per dozen prompt and 8s. December delivery."

Unequal Compression Trouble.

Throttled down or driven at low speeds the engine ran perfectly, but when the speed was increased to 15 miles an hour or better, it would run unevenly. The valves had been ground and appeared all right. The spark plugs were changed and a test showed a good spark was being delivered at each plug. The ignition system was gone over and the points found in good shape, with all parts apparently in good working order. Changing the carburettor adjustment from a maximum to a minimum of richness of mixture proved unavailing. The push rods and rocker arms of the valves were in perfect order and yet the trouble continued. Finally testing the compression was tried, and one cylinder registered 60 lb., another 50 lb., and the other about 40 lb. each. Evidently here was the secret of the trouble, but what caused this unevenness of compression? Our problem was to locate it, and it was found due to weakened valve springs. The valves were not closing tightly nor quickly enough.—"Country Gentleman."

The Age of a Sheep.

The teeth are a fair criterion of age, but like those of human beings, sheep's teeth last well in some cases, and go quickly in others. Merinos' teeth in Australia grow long with age, but in Lincolns and other longwool breeds and crosses it is found that they often wear short.

In a general way a sheep cuts its first two incisor teeth at sixteen months, the next two at twenty-four months, the next two at thirty months, and the final two incisors about two months later. These ages by teeth apply to early country, such as all the western portions of New South Wales, but in the eastern division they get their teeth later.

To tell five years from six and six from seven requires considerable experience, but, generally speaking, it will be found that the width of the outer two incisors is a good criterion.

It is not generally known that sheep cut their wisdom teeth at about sixteen months old, and this no doubt entails considerable pain, as it does in man, and is one of the reasons why it is so difficult to fatten hoggets.

Tanning Hides.

Tanning hides by the method described below is an easy process, according to a member of the Butter Branch of the South Australian Farmers' Bureau, and takes very little time:—First, the hide should be put in a mixture of lime and water, so that the hair can be scraped off easily. The hide should then be laid on a flat and clean surface and scraped on both sides to take off the hair, fat, meat, &c. It should then be left in clean water until the tan liquid is ready. The liquid consists of one 4-gallon bucket of wild peach or quondong bark added to 20 gallons of water. When cold, the hide can be immersed in the solution. Care should be taken that the tan is not too strong until the hide commences to show the colour of the liquid. Then the liquid can be made as strong as possible by adding more scalded bark. The addition of three buckets of bark will in most cases prove sufficient. All that remains to do is to air the hide once a week. The process will take three to four months. Care should be taken when airing the hide that it is not allowed to become dry and stiff. When the hide becomes heavy it is a sure sign that it is nearly tanned. After the hide is tanned, it should be washed in two or three waters, but not allowed to become dry until the dressing is applied. When the tanner is applying the dressing—a mixture of mutton fat and beeswax—the hide should be hung over a rail, and the dressing well rubbed into the leather on the flesh side with a block of wood. The hide can then be left to dry until required for use. If the dressing is not applied, the leather will become hard and wrinkly, and will stretch, crack, and break when used. Any red bark will tan leather. Tanning a rabbit skin will take three weeks, a kangaroo skin six to eight weeks, and a hide three months.

A Deadly Enemy.

Every time you kill a female fly in early spring you have a right to feel that you have routed an army, for it is said that the posterity of one female fly, if unchecked, would amount to seven septillions. (If you want to know how many that is, put down a figure 7 and write 24 zeros after it.)

At that rate we know that there would be no room on the earth for any other animal life. But fortunately there is a high natural death rate among flies and their eggs, and human beings are learning that we must help it along. So kill as many as you can, for a fly is of no benefit to anyone. They carry all sorts of disease and unmentionable filth on their feet; invisible, of course, but very much alive, just the same.

Farms are about the hardest place in which to deal with flies as they necessarily furnish daily the fly's favourite breeding places. The first thing in eliminating flies is to clean up thoroughly manure piles and keep them cleaned just as far as possible either by screening, by distributing on fields, or by treating with some chemical.

There are all sorts of fly traps, poisons, and papers. These help a lot. When you have done all the killing possible then screen everything you can against them.

Flies have killed more people than all the beasts and reptiles put together, simply because they don't appear to hurt us and we are not afraid of them. They are wolves in sheep's clothing, for they carry anthrax, typhoid, dysentery, and a host of other malignant things. In fact, they have been proven to be carriers of at least thirty different diseases and parasitic organisms, such as worms. They do not do a whit of good to anyone, so let's organise and fight them.—"The Queenslander."

Tick Eradication—State and Commonwealth Co-operation.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) stated, in the course of a recent Press interview, that in July last he received a letter from the Minister for Agriculture in New South Wales, relative to co-operation between this State, New South Wales, and the Commonwealth Government for the eradication of the tick pest, in which he suggested a meeting between representatives of the several Governments. To the proposal in principle Mr. Gillies readily agreed, and when in Sydney later he discussed the matter with Mr. Chaffey and agreed to a meeting, which was held in Brisbane on the 16th of September. The representatives at the meeting were Sir George Knibbs (Institute of Science and Industry) representing the Commonwealth, Mr. E. G. E. Scriven (Under Secretary, Department of Agriculture and Stock), Major A. H. Cory (Chief Inspector of Stock), and Mr. W. D. C. McNeill (District Stock Inspector, Toowoomba), representing Queensland; Messrs. G. Valder (Under Secretary, Department of Agriculture, Sydney), C. J. Sanderson, and Max Henry, representing New South Wales. The meeting suggested that there should be co-operation between the New South Wales, Queensland, and Commonwealth Governments for a period of six years, the first three years to be devoted to work entirely in New South Wales. The contributions proposed during that time are that if New South Wales spends £91,000, the Commonwealth shall contribute £58,000. As no special work can be commenced in Queensland until New South Wales is cleansed of ticks, the undertaking for Queensland is that it shall continue the eradication of ticks within its own borders. For the second period of three years, assuming that New South Wales is clean of ticks, New South Wales agrees to contribute not less than the sum spent by Queensland, but not exceeding £25,000, and the Commonwealth contribution shall not exceed £58,000 a year.

A Board is to be established of representatives of the co-operators to lay down the broad lines upon which the work shall be carried out, but it is clearly understood that the administration shall lie with the States and there will be no interference in the methods pursued by each State in this work. The Queensland Government has approved of the proposed scheme and the New South Wales Government has done likewise, and it now only remains for the Commonwealth Government to signify its intention of co-operating.

Grade Standards for Tomatoes.

Grade standards for Queensland-grown tomatoes have been fixed as follow:—

"A"—Sound, clean, well-formed, mature fruit, free from cat-face and other blemish, and not sunburnt.

"B"—Sound, clean, mature fruit, containing not more than 25 per cent. of blemished fruit and not sunburnt.

"C"—Sound, clean, mature fruit, containing more than 25 per cent. of fruit affected with cat-face or other blemish and not sunburnt.

Special sizing grades have been provided for the Stanthorpe district, *i.e.*, within a radius of 25 miles of the Stanthorpe Post Office. In Stanthorpe, therefore, tomatoes must be sized into the following six sizes:—

"Small"—Tomatoes under 2 inches.

2 inches—Tomatoes of 2 inches or more diameter, but less than 2¼ inches.

2¼ inches—Tomatoes of 2¼ inches or more diameter, but less than 2½ inches.

2½ inches—Tomatoes of 2½ inches or more diameter, but less than 2¾ inches.

2¾ inches—Tomatoes of 2¾ inches or more diameter, but less than 3 inches.

"Large"—3 inches and over in diameter.

"Blemishes" are defined as follows:—

1. A ring crack which is more than skin deep or extends more than 15 per cent. down surface of the tomato from the stem.

2. A radial crack which is more than skin deep or extends more than ½ inch from the stem.

3. Punctures from insects or other causes which are more than skin deep or affect more than 5 per cent. of the surface of the fruit.

4. "Cat-face" covering more than 10 per cent. of the surface of the fruit, or not having an unbroken surface, except in the case of tomatoes under 2½ inches, in which case "cat-face" in any extent is a blemish.

5. Skin marks other than disease blemishes covering more than 10 per cent. of the surface of the fruit.

6. Sunburn.

A Point in Tuberculosis Eradication.

The marketing of pigs with a "tattoo" instrument which has been devised in the United States Department of Agriculture, for use in tuberculosis eradication investigations, has in some instances incriminated the "old hen" on the farm as one of the accomplices in the spread of the infection to swine. The tattoo marks placed on the pigs shipped from an area where tuberculosis is prevalent among cattle and poultry maintains the identity of the pigs even after they have gone through the scalding and scraping process in the packing plant, and makes it possible to trace any infection to its source.

According to Dr. T. S. Rich, inspector in charge of tuberculosis work in Michigan, U.S.A., fowl tuberculosis, if sufficiently prevalent, may cause serious infection among pigs. In a campaign designed to eradicate the disease among cattle, infected pigs were found to be coming from farms on which no cattle were kept, or on which the herds had been free for some years. Continuing their veterinary detective work, the investigators applied the tuberculin test to fifteen lots of chickens, containing seventy-five head. Twelve of the fifteen lots contained reactors. Tests were also applied to the pigs on the farms, with the result that 17 per cent. of swine infection was indicated. In the absence of bovine tuberculosis on the farms where the pigs originated, the tests incriminated tuberculous fowls as the probable source of infection.

Tuberculosis in fowls occurs chiefly among the older birds, especially those more than two years old. The most conspicuous symptom is a rapid loss in weight, especially the emaciation of breast muscles. The investigations quoted indicate that dead fowls should never be fed to pigs, but should be burned or buried.

Australian Produce at Wembley.

Mr. H. W. Mobsby, Queensland Officer, Australian Pavilion, British Empire Exhibition, Wembley, England, and also of this Department, writes, under date 27th August:—

The attendance at Wembley to date has reached the great aggregate of 11,572,997 people. For the past six days the attendance has been 1,287,997. The attendance in our Australian Pavilion has been 6,500,000. This week is "Wales Week" and to-day was very heavy, so you see we are not having any slack time in attending the many inquiries about cotton and sugar. People are asking about the 70,000 tons for export this year, where and to whom will it be sent? I have been asked if it is possible to sell any of the sugar we have exhibited—at the close. All say how they ask for Australian cane sugar but cannot get it at the stores.

The Home and Colonial Stores have a stall in our Pavilion and sell Australian products, including cheese, butter, canned fruits; but they had no pineapples or other Queensland fruit, so I had a surplus of State cannery pines and jam in the basement which I handed over to them to sell, instead of holding it until the end and letting it go at a sacrifice and without a test of our goods on the market. The result is, out of 600 tins of pines they have sold 425 at 1s. 6d., and out of 144 1-lb. tins of jam they have sold out at 8d., and out of 67 2-lb. tins of jam (pineapple) they have sold 36 at 1s. 5d., and people are constantly asking for the 1-lb. tins of pineapple jam. It is a pity the market here cannot be kept supplied. With regard to the big cheese which was taken by the Home and Colonial Stores, I have been told the weight was, when cut up, 1 ton 5 cwt. 1 qr. 23 lb. At one of their branch stores they sold over 600 lb. in one evening. They tell me that they still have people asking for some more of the "big cheese," the flavour was so good. There is a great demand here for our honey. I have sold two 60-lb. tins to a restaurant in the Strand (Smith's honey). There is a stall in our building selling honey put up by Burnside (Australian honey) and they are having great sales. The same man is selling Australian apples and oranges. On Whitmonday over 2 tons of apples were sold. The dried fruits are very popular, especially the sultanas of the Australian Dried Fruit Association. It has become quite a custom to walk through our building eating sultanas from a 6d. carton, but it all shows how our goods are becoming popular, and it is hoped that the energies of the producers will be compensated with a continuance of the trade created or stimulated by the exhibition. We have had very many inquiries about our timbers.

A Mr. V. B. Trapp is in London selling our timber, and finds that he can get very good prices for planks of our cabinet timbers, and I have referred many to our Forestry Department. Only yesterday I had an inspector from the War Office for timber for tool handles and wagon timber. He was greatly impressed with the story of our forestry resources.

What is a Balanced Ration?

A balanced ration is one in which the essential constituents are supplied in adequate amount and in correct proportion for the purpose in view; or, in more definite language, a balanced ration is one which supplies an adequate amount of starch equivalent, containing the requisite quantity of digestible protein, and combined with a suitable bulk of food for the purpose in view.

In addition to the primary consideration of adequate supplies of starch equivalent and digestible protein in the construction of balanced rations, many other factors must be taken into account, of which the following are a few of the more important:—

(1) The stock of home-produced foods on hand.
(2) Relative costs of foodstuffs.
(3) Palatability.
(4) The characteristics of the foodstuffs used as regards the laxative or costive effects; the percentage of fibre; their effect on the colour and flavour of butter and milk; and in some cases their effect on the flavour and texture of the meat.
(5) Mineral matter.
(6) Vitamins—in some cases.

In commencing to build up a balanced ration it is necessary to ascertain approximately what quantities of such foods as are on hand can be spared per head per day. If, on calculation, it is found that the allowance of foods is insufficient to supply a ration which complies with the required feeding standards, consideration must then be given to the purchase of suitable supplementary foods.

Keep Clear of Abortion.

If you want to keep clear of abortion, remember the following points, written in the "Farmers' Advocate" by Dr. C. P. McGilvray, Principal of the Ontario Veterinary College:—

1. In purchasing breeding cattle, make careful inquiries to ascertain if the herd from which they are being obtained is free from abortion disease.

2. If doubt exists as to their freedom from this disease, have all newly obtained pregnant females tested, or keep them under observation until they calve.

3. Cows should be placed in maternity stalls to calve.

4. Whenever a cow aborts keep her isolated until she cleans.

5. Thoroughly clean and disinfect the stalls in the stable. The bedding and litter removed from the stalls should be burned, together with the aborted fœtus and the afterbirth.

6. Wash the hind parts of all the exposed pregnant cows with an antiseptic solution.

7. Cleanse the genital passage of the aborting animal in all cases of retained afterbirth. Irrigate the womb with a mild, warm antiseptic solution or a saline solution. Make use of uterine antiseptic capsules.

8. Do not allow cows with retained afterbirth to remain in stalls adjacent to other pregnant females.

9. Keep aborting cows segregated from the others so long as they are discharging. Wash their hind parts before allowing them to return to the herd.

10. Allow period of one month to elapse before returning aborting cows to the bull. Wash the bull's sheath after service of aborting cows.

11. Do not allow the bull to serve cows which have a discharge from the vulva. Serve all cows on neutral ground.

12. In affected herds obtain the advice of a qualified veterinarian as to the use of vaccines combined with sanitary measures.

13. In badly affected herds best results are obtained from the use of a live culture vaccine administered to the non-pregnant females two months before breeding.

14. In the case of valuable cows becoming barren, the services of a skilled veterinarian should be obtained for the purpose of treating the womb and ovaries.

15. If calves become affected with white scours, immediately separate the sick ones from the healthy. Consult a veterinarian regarding the use of calf-scours serum in conjunction with sanitary measures.

16. Nutritional deficiencies should be corrected as far as possible by supplying mineral elements in the feed.

Products Pools Acts.

Regulation 2 of the Primary Products Pools Acts has been altered. The object of this alteration is to make the ballot-paper regarding the constitution of a Pool Board clearer for the benefit of voters.

Stunting Heifer Calves.

Our observations through many years, writes "Hoard's Dairyman," have led us to the conclusion that one of the pressing needs of the hour is to disseminate a more general appreciation of the importance of fully developing heifers of the dairy breeds. On every hand we see stunted animals that were sired by purebred dairy-bred bulls, and were fondly expected by the inexperienced breeder to develop into dairy cows such as "he saw at the show." Many of such breeders harbour the erroneous belief that the employment of a purebred, pedigreed bull of a dairy breed is all that is necessary to grade up his dairy stock and get into a fine producing lot of animals. We think this unfortunate belief is largely due to the stressing of the idea of breeding to purebred bulls, without impressing upon beginners that the bull only gives the animal a start and endows it with the possibility of better milk and butter fat producing powers, if it happens to be a bull from bred-for-performance ancestors.

The result of the employment of stunted, scrubby-looking, indifferently-bred pedigreed bulls has been unsatisfactory everywhere, and it would have been a blessing if the bulls of that sorry sort had been castrated and beefed. But that is a phase of the subject that can more readily be mended than the failure to develop heifer calves from really worth-while bulls, and we hope that those who are doing extension work to generalise the use of purebred sires will pay due attention to the feeding and management side of calf-raising. The calf clubs have already done much good in that direction. More good might be done were every buyer of a purebred bull furnished with plain directions for the development of the progeny of the sire. Someone who has the necessary experience and information should get out a little brochure of that sort, and it should be made emphatic, impressive, and convincing, as well as scientific and practical.

Travelling about, we see on far too many farms in fly-time in summer dairy calves in dry, brown pasture, where there is little shade and often no drinking water. Other calves are tethered on the roadside under trees; some are in old orchards, or on the front lawn under a bush; others are in dirty yards or pens where the ventilation is poor and sanitary conditions conducive of disease. No real progress is made in such places towards the possibilities of dairy performance conferred upon the heifer calf by its sire, if that animal were capable of such transmission of desirable qualities. On all farms where old or permanent pastures are used year after year by cattle and other stock, and no provision of newly-seeded, legume rich grazing can be provided for the young cattle, the calves will do far better if kept off grass during the first year of life, and fully developed by the hand-feeding of adequate, well-balanced rations. Lung worms quickly infest young calves on old grass on many farms, and on others stomach worms are contracted there. Such infestation inevitably means lack of perfect development, and often serious losses. The old pastures often sour and lacking in lime elements, also fail to supply frame-building materials for the growing animals, and stunting is partly due to that.

The provision of all of the elements necessary for perfect development of the bony frame and of all of the tissues of the calf must be supplied if dairy heifers are to materialise all of the attributes and excellencies of bred-for-performance animals. Every man who has calves to raise will do well to study carefully, and religiously follow out in practice, the rules laid down by research men like McCollum, Hart, Morrison, Humphrey, Forbes, Fraser, and the other practical and scientific workers who have done and are doing so much to help the average farmer to get into a more profitable class of producing dairy cows.

Points for Young Dairymen.

The milk pails require thorough washing, both inside and out. Scalding and then placing all dairy utensils in the sun is a very good practice.

The prepotency of the sire in fixing and transmitting desirable characteristics is verified in innumerable instances with all classes of live stock.

Immediately after a calf is born the navel should be dressed with an antiseptic dressing, which should be repeated daily for three or four days.

This is the time of year when the calves on grass require some shelter from the sun. If there are no trees, a framework may be built up to afford shade.

Those who have an eye to the future are selecting higher quality and more productive breeding stock.

The extra training of the cattle and horses to lead and stand will show to advantage before the judge at either the large or small exhibition.

If a can holds 100 lb. of water, to fill it with milk would require about 103.2 lb. This is because milk has a greater specific gravity than water.

Do not leave barbed wire lying around. We saw a cow the other day with a teat badly lacerated by a prong of wire. This made milking her almost impossible for a few days.

During the hot weather extra care is necessary to keep the milking machine and cream separator clean and sweet. If either machine is dirty, it is a poor advertisement for the business.

If a bull calf is intended to be kept in the herd for stud purposes he should be "ringed" when quite young. About six months is the best age, and the ring must be replaced by a larger one as the bull grows older.

Some animals are subject to attacks of indigestion. A treatment used is equal parts of sulphate of iron, gentian, ginger, nux vomica, and bicarbonate of soda. Give a heaped tablespoonful three times daily in a pint of water.

In cheesemaking the ripened curd must be broken by hand into pieces about the size of walnuts. If it is not done very carefully a loss of fat will be experienced. Do not squeeze the curd in the hand—just break it with the fingers.

Learn to recognise your poorest cows by means of the weigh scales and the Babcock test. The man who fools away his time feeding cows that do not return the cost of feed should be at some job which does not require brain work. Dairying is not that kind of a job.

Grass is an ideal feed for dairy cattle, and the chief economy of the dairy cow lies in her ability to use roughages economically. At the same time the dairy farmer can often feed some grain on pasture to advantage, even though the grass may not be noticeably short.

There are some cows that will drop off in their milk flow if excited. The way some herds are brought in from the paddock, it is a wonder they give any milk. A good dog is an asset, but a poor one can be very expensive to the dairyman. It does not pay to dog the cows.

The man responsible for the adage "Feed is half the breed" was possessed of true wisdom. Proper feeding is of the very highest importance in any beef or dairy herd. An even distribution of good firm flesh, with a proper modicum of fat, topped by bloom and finish, represents the height of good feeding, and is very far removed from flabbiness and grossness.

Answers to Correspondents.

Giant Couch *(Panicum muticum)* and Rhodes Grass.

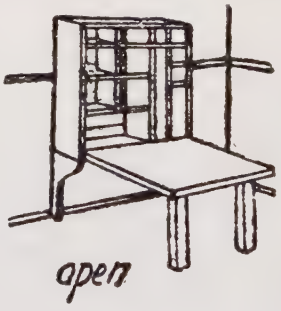
W.R.S. (Mount Larcom)—

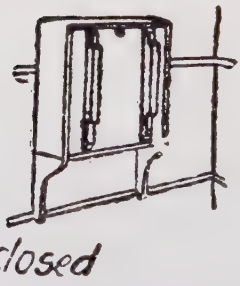
Your inquiry concerning a comparison of Giant Couch grass with Rhodes grass was referred to the Agricultural Chemist, Mr. J. C. Brünnich, who states that Giant Couch, like most of the panicums, contains a hydrocyanic acid yielding glucoside, sometimes present in dangerously high amounts, and caution when feeding it, particularly if stock are allowed to graze, must be observed.

The Director of Agriculture, Mr. H. C. Quodling, also advises:—Giant Couch (*Panicum muticum*) is an excellent grass in sub-tropical and tropical localities. Stock find it very palatable during the growing season. The grass is partial to rich scrub soil, but does best in districts where there is a generous rainfall. It thrives well in shallow swamps and low-lying situations which are not inundated for lengthy periods. If "Giant Couch" were a free seeder, it might be fair to compare it with Rhodes grass, were consideration given to the matter of a choice of a grass for recently burnt off scrub land; however, it is never likely to assail Rhodes grass either in popularity or its adaptability for this particular class of country, for the simple reason that "Rhodes" grows and spreads so quickly from seed, whilst the Giant Couch does not seed ordinarily, and must be planted out by hand from cuttings.

FOLDING BENCH AND TOOL-BOX.

Time consumed in carrying tools between locker and bench, when simple jobs are being done, is saved if the tool box is equipped with a combination bench and door, attached by hinges to the bottom. An illustration which appeared recently





in the "Country Gentleman" describes a cabinet of this kind which has much to recommend it. The legs are placed at one end only, as the other end is supported by the box; these will be strong enough if made of 2-in. by 3-in. timber and fastened by small hinges to two braces, or cleats, which run the length of the bench. When the box is closed, the legs fold up against it and take up very little room.

Farm and Garden Notes for December.

Although November is regarded generally as the best period for planting the main maize crop, on account of the tasselling period harmonising later on with the summer rains, December planting may be carried out in districts where early frosts are not prevalent, provided a known quick maturing variety of maize is sown.

To ensure a supply of late autumn and winter feed, dairymen are advised to make successive sowings of maize and sorghums, to be ultimately used either as green feed or in the form of silage. The necessity for such provision cannot be too strongly urged. Farmers who have not had any experience in building an ensilage stack can rest assured that, if they produce a crop for this purpose, information and instruction on the matter will be given on application to the Under Secretary for Agriculture and Stock; also that, whenever possible, the services of an instructor will be made available for carrying out a demonstration in ensilage-making for the benefit of the farmer concerned and his immediate neighbours.

In districts and localities where supplies of lucerne are not available, sowings of cowpeas should be made, particularly by dairymen, as the lack of protein-yielding foods for milch cows is a common cause of diminished milk supplies and of unthriftiness of animals in dairy herds. Cowpeas and lucerne can be depended upon to supply the deficiency. The former crop is hardy and drought-resistant. When plants are to be used as fodder, it is customary to commence to feed them to stock when the pods have formed. Animals are not fond of cowpeas in a fresh, green state, consequently the plants should be cut a day or two before use. Economy is effected by chaffing beforehand, but the plants can also be fed whole. Chaffed in the manner indicated, and fed in conjunction with green maize, or sorghum, when in head, in the proportion of one-third of the former to two-thirds of the latter, a well balanced ration is obtainable. Animals with access to grass land will consume from 40 to 50 lb. per head per day; a good increase in the milk flow is promoted by this succulent diet. The plant has other excellent attributes as a soil renovator. Pig-raisers will find it invaluable also.

A great variety of quick-growing catch crops, suitable for green fodder and ensilage purposes, may also be sown this month, notably Sudan grass, white panicum, giant panicum (liberty millet), Japanese millet, red and white French millet. Well prepared land, however, is required for crops of this description, which make their growth within a very limited period of time. French millet is particularly valuable as a birdseed crop, the white variety being more in favour for this purpose.

Successive sowings may be made of pumpkins, melons, and plants of this description.

In districts where onions are grown, these will now be ready for harvesting. If attention is given, in the case of garden plots, to bending over the tops of the onions, maturity of the crop is hastened. Evidence will be shown of the natural ripening-off process, and steps should be taken to lift the bulbs and to place them in windrows until the tops are dry enough to twist off. If a ready market is not available, and it is decided to hold over the onions for a time, special care should be taken in handling. Storage in racks in a cool barn is necessary, otherwise considerable deterioration is to be expected. Improved prices are to be looked for in marketing by grading and classifying produce of this description.

Cotton areas which were subjected to a thorough initial preparation, thereby conserving a sufficiency of moisture for the young plants, should now be making good headway and sending their taproots well down. Keep down all weed growth by scarifying as long as the growth will admit of horse work.

Kitchen Garden.—Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered, otherwise the plants will leave off bearing. Seeds of all these may be sown for a succession. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Where there is an unlimited supply of water, and where shade can be provided, lettuce and other salad plants may still be sown. All vacant ground should be well manured and dug two spits deep. Manure and dig as the crops come off, and the land will be ready for use after the first shower.

Flower Garden.—Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked layer beneath the loose soil. Alternate light with deep hoeings. A few annuals may still

be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulacca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. These may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant them out at once in their new positions. Top-dress all lawns.

Orchard Notes for December.

THE COASTAL DISTRICTS.

The planting of pineapples and bananas may be continued, taking care that the ground is properly prepared and suckers carefully selected, as advised previously in these Notes. Keep the plantations well worked and free from weed of all kinds, specially if the season is dry. New plantations require constant attention, in order to give young plants every chance to get a good start; if checked when young they take a long time to pull up and the fruiting period is considerably retarded. Small areas well worked are more profitable than large areas indifferently looked after, as the fruit they produce is of very much better quality. This is a very important matter in the case of both of these fruits, as with the great increase in the area under crop there is not likely to be a profitable market for inferior fruit. Canners only want first-class pines of a size that will fill a can, and cannot utilise small or inferior fruit, except in very limited quantities, and even then at a very low price. Small, badly filled bananas are always hard to quit, and with a well-supplied market they become unsaleable. Pineapple-growers, especially those who have a quantity of the Ripley Queen variety, are warned that the sending of very immature fruit to the Southern markets is most unwise, as there is no surer way of spoiling the market for the main crop. Immature pineapples are not fit for human consumption, and should be condemned by the health authorities of the States to which they are sent.

Citrus orchards require constant attention; the land must be kept well worked and all weed growth destroyed. Spraying or cyaniding for scale insects should be carried out where necessary. Spraying with fungicides should be done where the trees show the need of it. A close lookout must be kept for the first indications of "maori," and as soon as it is discovered the trees should either be dusted with dry sulphur or sprayed with the lime-sulphur, potassium, or sodium sulphide washes. Borer should be looked for and destroyed whenever seen.

Early grapes will be ready for cutting. Handle carefully, and get them on to the market in the best possible condition. A bunch with the bloom on and every berry perfect will always look and sell well, even on a full market, when crushed and ill-packed lines are hard to quit.

Peaches, plums, papaws, and melons will be in season during the month. See that they are properly handled. Look out for fruit fly in all early ripening stone fruit, and see that none is left to lie under the trees to rot and thus breed a big crop of flies to destroy the mango crop when it ripens.

Keep leaf-eating insects of all kinds in check by spraying the plants on which they feed with arsenate of lead.

Look out for Irish blight in potatoes and tomatoes, and mildew on melons and kindred plants. Use Bordeaux or Burgundy mixture for the former, and finely ground sulphur or a sulphide spray for the latter.

GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Early ripening apples, plums, apricots, peaches, and nectarines will be ready for marketing during the month. They are unsatisfactory lines to handle, as the old saw, "Early ripe, early rotten," applies to all of them; in fact, the season of any particular variety is so short that it must be marketed and consumed as quickly as possible. All early ripening deciduous fruits are poor carriers and bad keepers, as their flesh is soft and watery, deficient in firmness and sugar, and cannot, therefore, be sent to any distant market. The available markets are quickly over-supplied with this class of fruit, and a glut takes place in consequence. Merchants frequently make the serious mistake of trying to hold such fruits, in the hope of the market improving, with the result that, instead of improving, the market frequently becomes more and more congested, and held-over lines have to be sent to the tip. There is only one way to deal with this class of fruit, and that is to clear the markets daily, no matter what the price, and get it distributed and into consumption as rapidly as possible by means of barrowmen and hawkers. Most early ripening fruits are useless for preserving in any way, their only value being what they will bring for consumption whilst fresh. This being so, it is only a waste of time and money to forward immature, undersized, and inferior fruit to market, as it is not wanted, and there is no sale for it. It should never have been grown, as it is frequently only an expense to the producer, besides which, unless the fallen or over-ripe fruit is regularly and systematically gathered and destroyed in the orchard, it becomes a breeding ground for fruit fly and codlin moth, as well as of fungi, such as those producing the brown and ripe rots. Early ripening fruits should, therefore, be carefully graded for size and quality, handled, and packed with great care, and nothing but choice fruit sent to market. If this is done, a good price will be secured, but if the whole crop—good, bad, and indifferent—is rushed on to the local markets, a serious congestion is bound to take place and large quantities will go to waste.

Orchards and vineyards must be kept in a state of perfect tilth, especially if the weather is dry, so as to retain the moisture necessary for the development of the later ripening fruits. Where citrus fruits are grown, an irrigation should be given during the month if water is available for this purpose, excepting, of course, there is a good fall of rain sufficient to provide an ample supply of moisture.

Codlin moth and fruit fly must receive constant attention and be kept under control, otherwise the later-ripening fruits are likely to suffer severely from the depredations of these serious pests.

Grape vines must be carefully attended to and sprayed where necessary for black spot or downy mildew, or sulphured for oidium. Where brown rot makes its appearance, spraying with the potassium or sodium sulphide washes should be carried out. Leaf-eating insects of all kinds can be kept in check by spraying with arsenate of lead.

Vegetables will require constant attention in the Granite Belt area. Tomatoes and potatoes will require to be carefully watched in order to prevent loss from Irish blight, and no time should be lost in spraying these crops should this disease make its appearance in any part of the district, as it can be prevented by spraying with either Bordeaux or Burgundy mixture. These fungicides effectually protect the plants to which they are applied if used in time. If leaf-eating insects, such as beetles, grasshoppers, and caterpillars, are doing damage as well, add 3 or 4 lb. of arsenate of lead to the 100 gallons of spraying mixture used for the prevention of early and late blight (potato macrosporium and Irish blight), so that the one application will be effectual for both classes of diseases.

Keep all kinds of vegetables well worked, stirring the land frequently to retain moisture, and taking care to prevent the formation of a surface crust should rain fall. Remember that vegetables require plenty of moisture; therefore leave nothing to chance, but do your best to retain all the moisture in the soil you possibly can.

GOVERNMENT AGRICULTURAL LABORATORY.

INSTRUCTIONS FOR THE COLLECTION OF SAMPLES, AND SCALE OF FEES.

General Instructions.

1. All analyses will be carried out in the order in which the samples are received at the Laboratory, with the exception of perishable substances, which will be analysed immediately after arrival.

2. Should any person wish for an immediate analysis, the fee, charged in accordance with the scale of fees below, will be increased by 50 per cent.

3. The samples may be forwarded by parcel post or by rail, carriage paid, to the

Under Secretary for Agriculture and Stock, Brisbane.

In all cases a letter, giving full instructions as to the information required, and enclosing the prescribed fee, must be sent at the same time.

4. Analyses will only be carried out if these instructions are adhered to, and if the samples are taken in accordance with further instructions issued below.

5. The Under Secretary may, under special circumstances, modify the fees charged for analytical work.

SCALE OF FEES FOR ANALYSES.	Public. £ s. d.	Farmers, &c.* £ s. d.
Butter, cheese, margarin, commercial analysis	3 3 0	0 10 6
Butter, cheese, margarin—determination only of boric acid, sulphites, salt, ash, &c., each	0 10 6	0 2 6
Condensed milk, milk powders, commercial analysis	3 3 0	0 10 6
Cream and milk—Fat only, by Babcock test	0 5 0	0 2 6
Cream and milk—Fat only, by Gottlieb Rose test	1 1 0	
Cream and milk—Commercial analysis	2 2 0	0 5 0
Cream and milk—Test for preservatives, each	0 10 6	0 2 6
Dip concentrates, arsenical dips—Commercial analysis	2 2 0	
Dip concentrates, phenolic dips—Commercial analysis	2 2 0	
Dip concentrates, mixed arsenical and phenolic dips	3 3 0	
Dipping fluids, weed destroyers—Arsenic only	1 1 0	free†
Fertilisers—Determination only of—		
Fat, lime, nitrogen, nitrate nitrogen, ammonia nitrogen, phosphoric acid water soluble, citrate (soluble and total), potash, each	1 1 0	0 3 0
Degree of fineness	0 10 6	0 3 0
Commercial analysis, including fineness but not fat—		
Blood manure, dried blood	1 11 6	0 3 0
Bone meal, done dust	2 2 0	0 6 0
Meatworks fertiliser, bone and blood mixtures	2 2 0	0 6 0
Mixed fertilisers, guano, complete	4 4 0	0 10 6
Rock phosphates	2 10 0	0 10 6
Superphosphates	2 2 0	0 6 0
Thomas phosphate, basic slag	2 2 0	0 6 0
Charge for sampling (excluding travelling expenses)	1 1 0	
Foodstuffs, grains, meals, oil cakes—Estimation of—		
Moisture	0 12 6	0 2 6
Crude ash	0 12 6	0 2 6
Crude fibre, crude oil or fat, crude protein, digestible protein, each	1 1 0	0 2 6
Complete commercial analysis	3 3 0	0 10 6

* Reduced fees apply only to such residents in Queensland whose main source of income is from agricultural, pastoral, and horticultural pursuits.

† Dipping fluids are analysed free of charge for the owners of all registered dips.

SCALE OF FEES FOR ANALYSES—*continued.*

	Public. £ s. d.	Farmers, &c.* £ s. d.
Insecticides, fungicides, &c.—See Pest destroyers.		
Leather—Commercial analysis	3 3 0	
Leather—Determination of glucose only	1 1 0	
Limestones, marls, quick lime	2 2 0	0 10 6
Meat extract—Commercial analysis	3 3 0	
Parchment papers, butter packing paper	2 2 0	
Pest destroyers—		
Arsenic—Commercial anlysis	2 2 0	0 10 6
Arensic—Determination of arsenic only	1 1 0	free
Arsenate of lead, arsenate of lime	2 2 0	0 10 6
Bordeaux mixture	1 10 0	0 10 6
Copper acetate, copper sulphate	1 1 0	0 10 6
Cyanide of potassium or sodium	1 1 0	0 10 6
Formalin	1 1 0	0 10 6
Iron sulphate	1 1 0	0 10 6
Lime-sulphur	2 2 0	0 10 6
Nicotine and nicotine compounds	1 11 6	0 10 6
Paris green	1 10 0	0 10 6
Petroleum or kerosene emulsion, red oil	1 1 0	0 10 6
Phenolic disinfectants, lysols, &c.	2 2 0	0 10 6
Sulphur, flowers of sulphur	2 2 0	0 10 6
Phosphorous pastes	1 1 0	0 10 6
Tobacco dust, tobacco preparations	1 11 6	0 10 6
Preservatives	2 2 0	0 10 6
Salt—Complete analysis	2 2 0	
Soap—Commercial analysis	3 3 0	
Soils—Estimation of—		
Lime, nitrogen, potash, phosphoric acid, each	1 1 0	0 3 0
Partial Analysis	3 3 0	0 10 6
Mechanical analysis	2 2 0	
Complete analysis, including citric soluble and mechanical analysis	5 5 0	
Sugar-cane	2 2 0	free
Sugars, syrups, molasses	3 3 0	
Tallow, titre test	1 10 0	
Tallow, acidity	0 10 6	
Tanning materials—Estimation of tannins and non-tannins	2 2 0	
Waters—		
Estimation of total solids and chlorine, each	0 10 6	
Partial analysis, for stock and irrigation	1 10 0	0 10 6
Complete analysis	4 4 0	
Wheat—Milling test	2 2 0	
Testing of dairy glassware—		
Milk and cream bottles	0 0 2 each	
Milk and cream pipettes	0 0 3 each	
Dairy thermometers	0 0 6 each	
Special thermometers, lactometers, Brix spindles	0 3 6 each	
Unpacking and repacking Babcock bottles	0 2 0 gross	
Testing N/10, alkali and acid	0 0 6 pint	
Preparing standard iodine solution	0 2 0 pint	

INSTRUCTIONS FOR TAKING AND COLLECTING OF SAMPLES.

Soils.

A rough sketch of the field, paddock, or block of land from which the samples are to be taken should be prepared to accompany the samples. The spots where the samples are taken are marked on this plan, and are numbered. This sketch plan should also indicate position of roads, creeks, gullies, ridges, general fall, and aspect of land, &c.

Should the soil in various parts of the block show a very marked difference, it will be necessary to divide the block into two or more parts. Should the different soil occur only in a small patch, this sample may be left out.

Not less than three samples should be taken in each section. A greater number is to be preferred, as a better average will be obtained. In order to obtain a fair average sample of the soil from a block of land, as nearly as possible equal quantities of soil are collected from various parts of the field.

At the places chosen for the taking of the samples the surface is slightly scraped with a sharp tool, to remove any surface vegetation which has not as yet become part of the soil.

Vertical holes from 10 to 18 in. square are dug in the ground to a depth of 3 ft. The holes are dug out like post-holes; an earth-auger facilitates the operation considerably, and the holes may be trimmed with the spade afterwards, and the holes cleaned out.

Careful note of the appearance of the freshly cut soil of any intermediate layer and of the subsoil should be taken. The depth of the real soil, which in most cases is easily distinguished, is also measured and noted for each hole. Note how deep the roots of the surface vegetation reach into the soil. If the soil changes gradually into the subsoil, as is the case in some places where the soil is of very great depth, this line of division can only be guessed approximately, and it is best to take the soil uniformly to a depth of 12 in.

With a spade a slice of soil, from 3 to 4 in. thick, down to the beginning of the subsoil or to a depth of 12 in., is now cut off and put on to a clean bag. The same is done with the subsoil, and the slice is taken from where the soil ends (or 12 in.) to the bottom of the hole, and this subsoil placed on another bag. Stones over the size of a pea may be picked out, the rough quantity of such stones estimated, and a few enclosed with the samples. Fine roots must not be taken out from the soil samples. The same operation is repeated at the other places chosen. Take careful note and give description of soils in each hole as numbered and marked on plan. The samples of soil collected on the one bag are thoroughly mixed by breaking up any large clods, and about 5 lb. of the mixed soil are put into a clean canvas bag, which is securely tied up and labelled. The same is done with the samples of subsoil collected separately on the other bag.

All the samples collected are afterwards placed in a wooden box.

It is important to use clean bags and clean boxes, and also that the samples should not be left in the neighbourhood of stables or manure heaps.

A short description of the land must accompany the samples and the sketch plan. In the case of cultivated land, state how long the land has been under cultivation, what crops were chiefly grown, results of such crops, was any manure applied, when, and what sort, and in what quantities per acre. In the case of virgin soil, state if the land was heavily timbered or not, ring-barked, if scrub or forest land what sort of timber was chiefly growing on the land. In all cases a description of the neighbouring land, outcropping rocks, &c., is of great value. Also state if the land is naturally or artificially drained or not; describe the land as regards its position to hills, roads, creeks, ridges, &c.

Only by adhering strictly to these instructions, and by giving minute details, can benefit be derived from the soil analyses.

Special forms of application for "*Advice as to Manurial Treatment of Soil*" have been prepared, and may be obtained from the Under Secretary, Department of Agriculture and Stock.

It is strongly advised to fill up one of these forms in each case when a sample of soil is submitted for analysis.

WATER.

It is best to collect and forward samples of water for analysis in stoppered glass bottles, generally known as Winchester quarts.

The bottles have to be perfectly clean, and stoppers must fit well. Corks should be avoided but if used must be new and well washed with the water before being used for closing the bottle.

When taking waters from taps, pumps, bores, the water must be allowed to run for a while before taking the sample. When taking the water out of a well, pond, or river, the bottle is completely immersed, but care must be taken not to disturb the mud or sediment at the bottom of the water. Before the sample is actually collected, the bottle is rinsed three times with the water, filling each time about one-third full. The bottle is then filled within about 1 in. from the top; the stopper is inserted and securely tied down with a clean piece of linen or calico.

The stopper must not be fastened or luted with sealing-wax, paste, plaster of paris, &c.

State for what purpose the water is to be used, as for irrigation, household purposes, factory use, steam boilers, stock, &c.

Forms of application for "*Analysis of Water*" have been prepared, and may be obtained from the Under Secretary, Department of Agriculture and Stock. Suitable bottles for taking samples of water, both for chemical analysis and for bacteriological examination, may also be obtained on application.

Fertilisers.

When taking samples of artificial manures from bags, the samples must be taken from different bags and at different places of the bag and not only from the top; or the contents are emptied on a heap and mixed up well, and the samples then taken.

The samples sent for analysis should not weigh less than ½ lb., and not more than 2 lb., and should be contained in a clean, dry bottle (lightning jars are very suitable), or stone jar, or in tins with tightly fitting lids. To each sample must be securely attached a label, giving all the particulars required by the regulations in connection with "*The Fertilisers Act of* 1914" and "*The Fertilisers Act Amendment Act of* 1916."

It is extremely difficult to obtain a fair average sample from a large quantity of a mixed fertiliser. Special precautions have to be taken, and a special sampling tool must be used. Minute instructions to take such samples are being prepared, and the inspectors under the Fertilisers Acts will be instructed in the proper method of procedure.

Foodstuffs.

It is always important to obtain good average samples, and this can only be done by carefully taking the samples from different places, mixing well, and taking a portion of the mixture. This method would apply to any dry foodstuffs—as grains of any kind, peas, beans, chaff, pollard, meal, &c. For the analysis of green foods —as green hay, sorghum, silage—it is best to make a mixture of the sample by passing it through a chaffcutter, and by taking an accurately weighed quantity—say, 3 lb. This quantity is then dried in the sun, taking care that nothing is lost, and when dry put in a bag and forwarded for analysis, stating how much of the original green stuff the total amount of the dried material sent represents.

To collect information about value of *green manures*, it is best to plot out exactly 1 square yard in the field covered with the plant, not picking out a position where the growth is very heavy or poor, but about a fair average. Four pegs are driven into the ground at the four corners, and strings stretched between them; with a sharp spade all the plants are cut along the strings, so as to get really the growth of 1 square yard. The plants are all collected and accurately weighed, passed through a chaffcutter, and the sample for analysis taken as above described. In many cases the roots may be also pulled out, weighed separately, and a sample forwarded.

The samples must be accompanied by a description of the crop—when planted, how old when cut, if the land was manured or not, weight of crop per acre or per square yard, and weight of the sample forwarded when in its green state. In the case of green manures it is generally best to take the samples just after flowering, and immediately before ploughing in.

Wheat.—Samples of wheat sent to be tested for their milling qualities, and analysis of flours obtained therefrom, should not weigh less than 2 lb. each, and should be well cleaned and free from weevils. Give full particulars about the locality in which the wheats were grown, and also the weight of the crop in bushels per acre.

Milk and Cream are best preserved for analysis by adding to every 8 oz. of liquid about 5 grains of powdered bichromate of potash, and mixing the sample with the preservative by shaking the bottle.

Should it be desired to have a sample of milk or cream tested for preservatives, a second sample should be sent in its natural state.

The sample bottles should be closed with a well-fitting cork, and placed with the cork downwards in the boxes so that the cream will not collect on the cork but on the bottom of the bottle.

Dipping Fluids.

Special forms for taking and forwarding dipping fluids for analysis may be obtained on application.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1924.	OCTOBER.		NOVEMBER.		DECEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5 33	5 50	5 3	6·9	4·51	6·32
2	5 32	5 51	5·2	6·10	4·51	6·33
3	5·31	5 51	5·1	6·11	4 50	6·34
4	5·30	5·52	5·0	6·12	4·50	6 35
5	5·29	5·52	5 0	6·13	4·50	6·36
6	5·28	5·53	4 59	6·13	4·50	6·36
7	5 27	5 53	4 59	6·14	4·50	6·37
8	5·25	5·54	4·58	6·14	4·51	6 37
9	5 24	5 54	4 57	6 15	4·51	6 38
10	5·23	5 55	4 57	6 16	4 51	6·39
11	5·22	5·55	4·56	6·17	4 52	6 39
12	5·21	5·56	4·56	6·18	4·52	6 40
13	5·20	5·56	4·55	6·18	4 52	6·40
14	5·19	5·57	4 55	6·19	4·53	6 41
15	5·17	5 58	4·54	6·20	4·53	6·41
16	5·16	5 58	4 54	6·20	4·53	6·42
17	5·15	5·59	4·53	6·21	4·54	6·42
18	5·14	6·0	4·53	6·22	4·54	6·43
19	5·13	6·1	4·52	6 23	4·55	6·43
20	5·12	6·1	4·52	6·24	4·55	6·44
21	5·11	6 2	4·52	6·25	4·56	6 45
22	5 10	6 3	4·52	6 25	4·56	6·45
23	5·9	6·3	4·52	6 25	4·57	6·46
24	5·9	6·4	4 51	6·27	4·57	6·46
25	5 8	6 4	4 51	6·28	4·58	6·47
26	5·7	6 5	4·51	6·28	4·58	6·47
27	5·7	6·5	4·51	6 29	4·59	6·48
28	5·6	6 6	4·51	6·30	5·0	6·48
29	5·6	6 7	4·51	6 31	5 0	6·49
30	5·5	6·7	4·51	6 31	5·1	6·49
31	5·4	6·8	...	...	5·1	6·49

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

6 Oct.	☾	First Quarter	12 30 a.m.
13 „	○	Full Moon	6 21 a.m.
21 „	☽	Last Quarter	8 54 a.m.
28 „	●	New Moon	4 57 p.m.

Perigee, 3rd and 30th October { 3 6 p.m. / 12 12 a.m.

Apogee, 18th October .. .. 6 18 p.m.

On the 10th October, at 8·17 p.m., Uranus will be in conjunction with the moon about three times the moon's diameter below it. This should be observable in binoculars.

On 22rd October, at about 10 p.m., Regulus will be occulted by the moon at Thursday Island, but not at Cooktown or Cairns, where Regulus will appear just above the edge of the moon; further south the distance between Regulus and the moon will appear greater.

On the 26th October, at 1·0 p.m., Mercury will be in superior conjunction with the sun—that is, on the far side of its orbit bepond the sun, where it will be quite invisible. Venus will be a morning star, and Saturn, Jupiter, and Mars will be visible in the evenings during this month.

4 Nov.	☾	First Quarter	8 18 a.m.
11 „	○	Full Moon	10 0 p.m.
20 „	☽	Last Quarter	3 38 a.m.
27 „	●	New Moon	3 15 a.m.

Apogee, 15th November, 11·0 a.m.
Perigee, 27th November, 10·36 p.m.

Venus, still the most brilliant morning star, will be about five degrees west of Spica (the principal star of Vergo) on the 15th; Mars on that date will be apparently amongst the smaller stars of Aquarius, setting about half-past 1 in the morning. Jupiter will be apparently amongst the stars of Scorpio about 15 degrees to the north-east of Antares. Saturn will be visible only in the east, rising about an hour before the sun.

3 Dec.	☾	First Quarter	7 10 p.m.
11 „	○	Full Moon	5 3 p.m.
19 „	☽	Last Quarter	8 11 p.m.
26 „	●	New Moon	1 45 p.m.

Apogee, 12th December, 6·36 p.m.
Perigee, 26th December, 11·12 a.m.

Mercury will be at its greatest elongation east of the sun on the 10th, and will rise and set one hour and twenty-four minutes after the sun on the 15th, apparently amongst the stars of Sagittarius. Venus will still be the brilliant morning star, rising about 2 a.m. on the 15th, apparently among the stars of Libra; Mars, having apparently reached the constellation Pisces, will set soon after midnight on the 15th. Jupiter will not be so well situated for observation, and will be lost in the sun's rays towards the end of the month. Saturn, as a morning star, will rise about half an hour before Venus in the middle of this month.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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